The Builder.

VOL. LXIX. NO. [illegible]. DECEMBER 21, 1895.

ILLUSTRATIONS.

Marble Screen and Throne in St. Lorenzo, Rome.—Measured and Drawn by Mr. Alfred Hart ..... *Double-Page Ink-Photo.*
Elevation and Details of Newgate Prison.—Measured and Drawn by Mr. G. J. Lacy ..... *Double-Page Ink-Photo.*
House, Paulton, Gloucester.—Mr. C. J. Blomfield, Architect ..... *Double-Page Ink-Photo.*
Proposed New Mansions, Storey's Gate: Front towards the Park.—Mr. Basil A. Slade, Architect ..... *Double-Page Photo-Litho.*

Blocks in Text.

Sketches illustrating Article on "Pre-Conquest Architecture in England" ..... Pages 454, 455

Accepted design for St. Oswald's Church, Fulham.—Messrs. A. J. Hopkins and W. V. Aspen, architects ..... Page 462

Recumbent Figure for the Harvey Memorial, Harberton Churchyard ..... Page 463

CONTENTS.

Building Contracts 453
Notes on Pre-Conquest Architecture in England.—VII. 454
Newgate Prison 455
Notes 456
The Royal Institute of British Architects 458
Glasgow Technical College 459
The Consett Ironworks 459
Experiments in Sewage Purification 460
An Australian Opinion on Tiles and Slates 461
Competitions 461
Archæological Societies 461
St. Oswald's Church, Fulham 462
Marble Screen, S. Lorenzo, Rome 462
Measured Drawings of Newgate 462
Proposed Home, Poulton, Gloucestershire 462
Storey's Gate, S.W. 462
Figure for the Harvey Memorial, Harberton 463
The London County Council 463
Architectural Societies 464
Engineering Societies 464
Shoreditch Baths and Library Competition 464
Home, *Suite* Home or Flats in Paris 464
Student's Column: Metals used in Building.—XXIV. and XXV. 465
General Building News 466
Sanitary and Engineering News 467
Miscellaneous 468
Foreign and Colonial 468
Legal 469
Meetings 469
Recent Patents 469
Some Recent Sales of Property 470
Prices Current of Materials 471
Tenders 471

Building Contracts.

WE cannot but express a wish that any writer who is full of knowledge of a special subject, and eager to give the public the benefit of it, would endeavour to do so in the most concise form which is compatible with clearness of exposition. It is to be desired, even on the lowest ground, that of expense, for we have before us this useful work, the price of which is 2*l.* 10s., a sum which places it out of the reach of many—at any rate of the younger of our readers, who would probably be those to whom it would be most valuable. We have no hesitation in saying that the book before us* might have been smaller in size, and have been not one iota less useful. It is in form written in sections—a system of much value where these sections contain statements of fixed and decided rules of law and practice. If, however, these sections contain perfectly well recognised facts, not of law, but of common knowledge, then the system is to a large extent useless, and at the same time, expresses the need of greater compression. We will give an example. At page sixteen, we find a sub-section headed "Sub-contractors," which contains the following words. "It is a common and growing practice in building work for persons who take contracts for large works to sublet part of the work, with a view either to obtain the benefit of the special skill of the sub-contractor, or to limit the risks and liabilities of the principal contractor." More to the same effect follows, but we have quoted enough to make any reader ask why is he to go into the motives which underlie the common practice of sub-contracting. All that those who take up this book desire to be told is, what are the rights and duties of contractors and sub-contractors towards each other and the principal employer. We make this criticism because we thoroughly appreciate the amount of labour given by the author to his task, and desire to see so laborious a work presented to the profession in the best possible form.

But we have another point of great importance to notice: it is that Mr. Hudson, in his praiseworthy desire to give as much information as possible to his readers, seems at times to state as legal principles what are not such, and therefore misleads those who may refer to his book. Thus, at page 52 we read, under the mysterious head of "Private Law," that "The architect is bound to ascertain whether any rights exist, whether of way, water, light, air, or other easements, or whether there is any reservation of minerals to which regard must be had in the planning and construction of the building, since the building owner is liable to adjoining owners for any infringement of their rights." If a person is "bound," that means that he is under some legal obligation to do a certain thing. Now we unhesitatingly say that the statement quoted is quite inaccurate. It is not for an architect to ascertain what may be the relative rights of adjoining owners, and if he does not so ascertain and damage ensues by a breach of such rights he is not in any sense liable. It is the duty of the owner of the property, when he instructs the architect, to inform him what are the particular rights in regard to his own and adjoining premises. Mr. Hudson goes so far as to say that to prevent interference with the rights of adjoining owners, the architect "ought to ask to see the conveyance or contract of purchase or building agreement relating to the land upon which the building is to stand, and also to inquire as to any easements," and so forth. According to this statement the architect should in fact perform the functions of a lawyer. This is altogether misleading; an architect may, as a friendly act, ask if there are any easements or rights which may have to be considered; but, *primâ facie*, his duty is to plan and superintend the erection or alteration of buildings, and it is for the owner to inform him what rights of others have to be respected. Again, under the head of "Recommending Builders," Mr. Hudson states, "The architect does not guarantee the solvency or capacity of the builder," a truism which does not require to be stated, "but it is his duty to his employer not to let him enter into a contract with a man whom he has any reason to suspect of being unable, from financial reasons or lack of skill or otherwise, to carry out the work with all due speed and in a satisfactory manner." It is a friendly act on the part of one man not to let his neighbour employ an insolvent tradesman, but it is a thing which should never be undertaken without the most absolute proof of insolvency. If an architect has reason to suspect the solvency or capacity of a builder, he may well inform the employer of some fact from which the employer may draw his own conclusions. But *primâ facie*, an architect, unless he has express authority to select a builder, owes no duty to his employer to protect him against an insolvent builder. Nothing is more undesirable than to throw on professional men burdens not strictly within the sphere of their duties, and it appears to us that Mr. Hudson endeavours to place on the shoulders of architects burdens which the law does not impose on them, and which no reasonable man can desire that it should.

It need hardly be said that this work does not contain a very large proportion of new material, nor does it throw much fresh light on the law of the subject. Perhaps the most important legal development is that which has finally settled the question of the architect's liability to the employer and the builder in regard to a final certificate. So far as regards the latter the architect's certificate is final, even if it has been negligently drawn up. But it is not final under such circumstances against the employer, who can recover damages in respect of such negligently-made certificate. It was the case of Rogers *v.* James, decided in 1891, which settled the law in this respect. That is to say, as between the employer and the contractor, the architect acts in a judicial capacity, and unless the contract makes some reservation in regard to the certificate, when he has given a decision, negligently or not, it is final. But, as between the employer and the architect, the latter is liable for negligence. He is in exactly the same position, as regards the giving of the certificate, as any other kind of agent who is employed to do some act which he must take care to do without negligence. It may be doubted whether the law was ever contrary to this; but it may fairly be admitted that in this country there had never been any strict judicial enunciation of it before the

* "The Law of Building, Engineering, and Shipbuilding Contracts, with Precedents and Reports of Cases." By Alfred A. Hudson, Barrister. Second Edition. In two Vols. London: Waterlow & Sons, and Stevens & Hughes. 1895.

judgment in the above-mentioned case. Therefore it may, with perfect justice, be said that the point has only recently been settled. It is well that an authoritative judgment should exist, since there can now be no doubt upon the question. It is one of the misfortunes of our legal system, composed as it is so largely of judicial decisions, that unless there is a judicial dictum on a point it may always be regarded as open to argument.

Apart from any question of pure law, perhaps the most noticeable features in connexion with the recent decisions are the impotent efforts of contractors to get rid of burdensome conditions in contracts. Sometimes they have fallen into very hard places, but in every instance they are tied and bound by their own agreement. For example, in the case of Jackson *v.* the Eastbourne Local Board, one clause of the contract made by the plaintiff and the defendant ran as follows: "The said contractor shall take upon himself and be answerable for all accidents and damages from or by seas, winds, drift of craft, fire, or any cause whatsoever, which may occur during the construction of the works under this contract, and in case of such accidents or damages arising, shall repair and make good the same as soon as possible at his own cost and charges." The works were injured by the sea, and an attempt was made to show that the Local Board should have kept the shore at the same level as shown on the plans, in which case the damage would not have been done. The litigation did not cease until the House of Lords was reached, where, as in the Court of Appeal, the contractor was defeated. At the beginning of his judgment the late Lord Selborne said "it is impossible not to feel sympathy with the appellant in this case, who probably has sustained a very great pecuniary loss by the misfortune which has happened to him in the execution of his contract, but in deciding the law we cannot be influenced by any feeling of that kind." It might have been possible for the contractor to have guarded himself against such a misfortune by the contract, or not to have entered into it at all. As it was he could only fight uselessly against the bonds which he had forged for himself. Not a little of the litigation arising out of building and similar contracts is in regard to these very stringent conditions, which often throw on the contractor losses which should more fairly be borne by both parties. But none of the recent decisions on the subject of the terms of building contracts, or indeed in most of the subjects of building law, contain new principles. They are mostly the application of old principles to new facts. Nothing is more interesting than to observe how this is done, but we are not altogether in sympathy with authors who elaborate these illustrations. To do so has a tendency to divert the attention of the reader from clear and broad principles, and it is only by having these firmly fixed in the mind that a sound judgment and opinion can be formed upon the often complex facts, out of which disputes and difficulties in building and similar contracts arise. If we attempt to come to a conclusion on one set of facts by drawing on our recollection of others, it is not improbable that a wrong judgment will be formed; if, on the contrary, we bear in mind some cardinal and governing principle, and test the facts in relation to that, the opinion formed is more likely to be sound.

NOTES ON PRE-CONQUEST ARCHITECTURE IN ENGLAND.

By Professor Baldwin Brown.

VII.—*Timber Construction, and its Traces in Stonework.*

It is not the intention of this paper to discuss the question, so often raised, about the relative numbers of wooden and stone churches in the Saxon period. As is well known, out of more than 1,700 churches mentioned in Domesday, only one is described in that Survey as being of wood, but it may just as well be argued from this that wooden churches were rare as that they were common. Saxon records, from Bede downwards, contain abundant references to timber-built churches, but the notices of stone structures are numerous enough to make it an open question whether, when no material is mentioned, we should assume it to have been the one material more than the other. We are not, however, concerned so much with wooden churches in themselves, as with their possible influence on the form and technique of churches in stone, and in this connexion it is important to note how numerous are the cases in which we read of an earlier wooden structure being later on rebuilt in stone, for in such instances it would seem a reasonable hypothesis that traces of the earlier technique would survive in the later. Thus, at York, the first church hastily erected by Edwin of Northumbria for his baptism was of wood, but he soon went on to build one of stone, and according to a passage quoted by Leland ("Collectanea," iv., p. 43) he did the same thing at Tynemouth. At Lastingham, Cedd builds a wooden church, but before Bede wrote his history (about 730 A.D.) it had been replaced by one of stone. In the tenth century the same thing was done at Wilton, and not long before the Conquest Ethelric, Bishop of Durham, repeated the process in the case of the church at Chester-le-Street.

In order to estimate what likelihood there is of the stone forms of Saxon churches being thus derived from wood, we must first ask in what style of wood construction the early timber structures were erected. Now it is not probable that the often-quoted expression, *mos Scottorum*, implied any special kind of construction in wood peculiar to the Celtic tribes, or that the Teutonic settlers brought with them any particular technique different from those practised by timber constructors all over the world. There are essentially three types of wooden buildings—the wattled hut, the block house, and the structure of framed timber work. The two former are primitive, and every country and every age must have produced abundant examples of them. The latter is scientific and proportionately uncommon. It is the contention of this paper that early Celtic and Saxon structures of wood were of the two former types, while framed work is a matter of classical tradition, and was probably rare, if not unknown, in the pre-Conquest period of our national architecture. The question, whether or not this contention is justified, is one which has considerable significance for the subject before us, for there are certain features of Saxon masonry for which an origin in framed timber-work has been suggested, and if no such timber-work can have existed the suggestion will naturally fall to the ground.

It is impossible to disprove the knowledge of the technique of framed timber-work on the part of the Saxons, for the art of shipbuilding, which they must have known in their Continental homes, cannot be carried far without introducing the ribs and planking which might readily develop into the frame-and-filling of the half-timbered house. M. Ruprich-Robert, in his "Architecture Normande," has a suggestion (which he does not follow out) about the influence of the tradition of shipbuilding among the northern sea-rovers on the timber work of the roofs in Norman architecture. Existing evidence tends, however, to show that when the Saxons wanted anything more solid than the wattle-work, which is in most regions the most primitive form of wooden building, they adopted the block-house system familiar in Switzerland and Canada. The various passages about wooden churches in Bede and later Saxon writers merely prove that they were solidly built with posts and timbers, so that they could be taken to pieces and the material used over again, but the character of the one surviving Saxon church of wood at Greenstead, in Essex, as well as that of timber structures represented on the Bayeux tapestry, enables us to conjecture that it would be the block system that would be generally employed.

Space does not permit of a detailed description of Greenstead Chapel (fig. 42), but it would be worth publication even in its

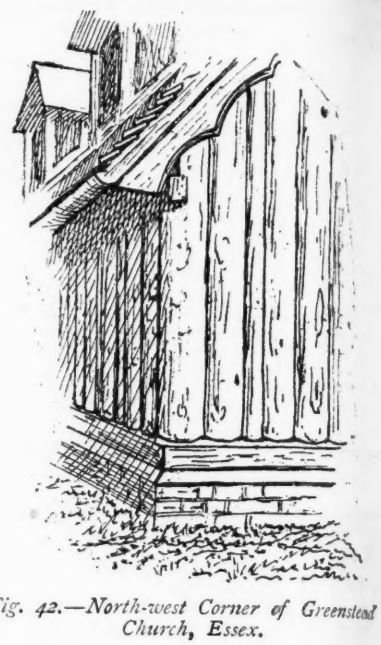


Fig. 42.—North-west Corner of Greenstead Church, Essex.

present restored condition. The walls of the nave, which from literary evidence may be dated about 1013, are formed of upright balks of timber made of trunks of oak-trees split down the middle, stripped of their bark, and smoothed with the adze on the flat faces. They were placed closely side by side with the flat faces inwards and the half-rounds showing on the exterior. Originally the trunks were let into a sill of oak at the bottom, and fastened at the top with wooden pins to a horizontal plate. The sill and the plate are, however, mere adjuncts rendered necessary for fixing purposes, and essentially posterior, and not prior, to the uprights that represent the main structure. In framed work, on the contrary, the skeleton is essentially prior to the filling, which is of slighter construction. There is no sign at Greenstead of any such organic relation between the corner-pieces, the sills, and the horizontal plates as would lead us to recognise in them the essential elements of the structure. This point is worth bringing into prominence, as Professor Dietrichson, in his recent book on the timber architecture of Norway, claims Greenstead as an example, though an undeveloped one, of framed work, and brings it into a certain connexion with the wooden churches of his own country. Now these Norwegian structures, highly interesting though they are, are not exactly of a primitive character. They are basilican in plan, were very often apsidal, and in such features as round-arched arcading, or cubical capitals, exhibit a direct imitation of Romanesque stone forms in wood, while no earlier date than the eleventh century is claimed for any existing example. The construction, as the writer just named has shown, is scientific, and depends essentially on the principle of "frame-and-filling." Greenstead, on the other hand, is a work of palisading, resembling in construction the timber fortifications on the tops of the mounds or *mottes* shown in the Bayeux tapestry. It is primitive in form and character, and shows no trace of influence from classical sources. It may, of course, be argued, in spite of this, that what we call half-timber work in the houses of the later Mediæval epoch was already known in Saxon days, but it is sufficient for our purpose to repeat that, in the absence of direct proof of this, it is safer to assume that Saxon timber construction was confined to some forms of wattle and block-work, so that it would be only from these sources that wood forms can have been transferred to stone.

What, now, are the principal features in Saxon stone buildings, for which a wooden origin has been claimed? Such an origin has been suggested, *inter alia* (1) for "long-and-short" quoining (Parker, in "Rickman," 6th edition, p. 63), and (2) for pilaster strips and cross-pieces between them, as well as the triangular pediments that sometimes join them above, as at Barton-on-Humber (fig. 43a), and Earl's Barton (fig. 43b.) (Parker,

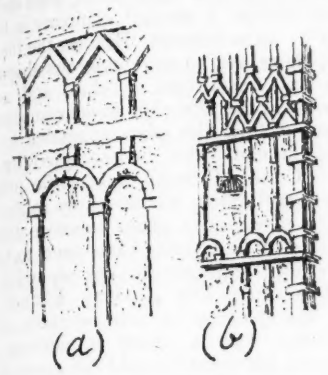


Fig. 43.—(a) *Barton-on-Humber;* (b) *Earl's Barton.*

"Introduction," 9th edition, p. 27; Romilly Allen, "Monumental History," p. 190). In connexion with (1) the point may again be emphasised that the use of "long-and-short" in the framing of openings, is prior to its employment in quoining. In openings we find it both in primitive Irish and in Byzantine work, but neither there nor anywhere else, so far as the writer knows, does it appear in corners, save in Saxon stonework. At Monkwearmouth and Escomb we have it in doors but not in quoins, though there are indications at Escomb of the latter use. Now, in doorways, where both the "long" pieces and the "short" are not beams or pillars, but flat slabs, there can be no suggestion of a wooden origin, for the flat slab is a stone, not a timber form. If, therefore, this peculiar alternation of stones in the quoins is derived from the similar bond used in doorways, then there can be no question of any copying of woodwork.

In the case of (2) the pilaster strips and their finish, Sir J. H. Parker ("Introduction," l.c.) regards them (at Earl's Barton) as "intended to bind together the rude masonry of the walls," "in the manner of a framework of timber"; while Mr. Romilly Allen ("Monumental History," l.c.) sees rather an artistic intention of relieving the monotony of flat surfaces. Probably both views are correct, and the constructive and æsthetic advantages of the feature were both of account. As constructive, it resembles a curious bond in stone-work, of a fashion shown in fig. 44, which occurs at Pompeii,

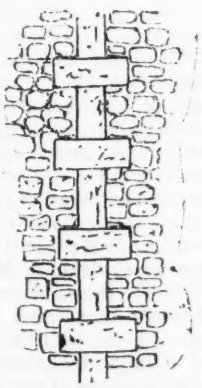


Fig. 44.—Wall at Tours.

in Roman work, in Mediæval buildings in the valley of the Loire, and in modern times over all the country round Caen. The Saxon pilaster does not only, however, act as a bond; it projects from the surface of the wall, and shows in front of the plastering, where it produces an effect similar to the shallow, square, pilaster-like strips common on German Romanesque churches, and called *Lisenen*. It is in truth nothing more nor less than a tentative effort on the part of our native builders to imitate the vertical strips dear to the Romanesque builders on the Continent. The latter are joined above under the cornice by a succession of small round arches, while in Saxon work the connecting wall-arches are commonly bigger, and may take the straight-sided form which occurs commonly enough in door and window openings. The "stone carpentry," as Sir J. H. Parker calls it, at Earl's Barton, though it may bear a superficial resemblance to the timbers of framed-work, is simply a somewhat irregular and clumsy form of Romanesque wall-arcading. When the pilasters are less numerous, and are not connected by the fantastic cross-pieces that occur at Earl's Barton (as for, example, at Stanton Lacy in Shropshire, Repton, or Corhampton) no one would think of framed timber-work. The resemblance to the German *Lisenen* is quite unmistakable, and the prevalence of wall-arcading in Continental Romanesque is quite sufficient to give us a key to the origin of the feature. When we add that, as we have seen, we have no warrant for assuming that the Saxons had framed-work from which to copy, the idea of a timber-origin loses all validity.

It may be safely stated that the idea of a wooden origin for the forms of Saxon stonework is rather a superstition than a conclusion strictly reasoned out. It is assumed that a people accustomed to construct in wood must carry their traditional timber-methods into their masonry, but this is by no means necessary. It is true that much of the stone architecture of Egypt and of Greece and Italy shows very distinct traces of an origin in wood construction. On the other hand, the Phœnicians were a people who built equally well in wood and in stone, yet do not seem to have carried timber-methods into masonry. They built Solomon a palace of wood at the same time that they constructed for him a temple of stone, but the latter was essentially a stone building, without, as far as we can judge, any timber features connected with it. In like manner the ancient Irish, though they may have possessed a *mos Scottorum* of wooden building, do not seem to have been influenced by it when working in stone. Those early specimens of Irish masonry, the great dry-stone forts of Kerry and Aran, are as essentially *stone* fabrics as the terrace walls of the Haram platform at Jerusalem—there is no trace in them of the influence of an earlier or a contemporary timber tradition. Irish stone architecture progresses from these dry-stone forts to the later round towers and churches of the twelfth century, without any admixture of wooden features derived from a native source, and the same thing may be said of the stone structures of the Saxons. Stone churches in pre-Conquest England took the place of wood without adopting timber features. The two traditional materials were used independently as they were used in Ireland, and the influence of native practice in the construction of ships or of houses of wood practically counts for nothing as an explanation of pre-Conquest masonry.

NEWGATE PRISON.

NEWGATE, like the Newport at Lincoln, marks the site of an entrance into a Roman city. The gate was made in the west side of the later city wall, of *circa* 365 A.D., for the ancient road, perhaps a British road, which from this point traversed London in a south-easterly direction, towards the crossing over the Thames, a little distance westwards from London Bridge. It were beyond our purpose to discuss here the origin of its name. Suffice it to say that, *temp.* William I., a gate, known as Chamberlain, or the Chamberlain's Gate,* stood across the street at a spot between Warwick-lane and the present prison. That gate, rebuilt in the reign of Henry II. or his successor, was, in the reign of Henry III., in common use as a prison. In the year 1400, Henry IV. committed it by charter to the care of the Corporation. Sir Richard Whittington, moved by the ruinous state of the fabric, combined with the terrible condition of the gaol, instructed his executors to rebuild the gate. That was done upon the customary plan. The central portion had an archway and a north postern; the four flanking octagonal towers had battlements. The two fronts had ranges of Tuscan pilasters with entablatures; one of the seven statues represented Liberty with a cat at her feet.* To this gate an addition was subsequently made, southwards, fronting Old Bailey, the added portion containing an entrance and a gaoler's lodge, above the latter being a sun-dial with the inscription, *Venio sic fur*. Of Whittington's prison there is an early view in a black-letter pamphlet, "The Discovery of a London Monster called the Black Dog of Newgate. . . . imprinted at London . . . . 1612," and in the Crace collection is an illustration (1650) from the rare "Herba Parietis," showing the wallflower growing by two of the windows. The east portion of Whittington's prison was repaired in 1630-1, and again in 1672, having suffered from the Great Fire—as we read in an inscription preserved by Hatton; the repairs of 1672 are said to have been executed by Wren. In 1638 the entire building was re-fronted; the author of the "History of the Press Yard" (1717), who was there amongst the Jacobites of 1715-6, says:—

> "This tomb of the living [the Press Yard] was once 'The Phœnix' Inn, by Newgate-street, and being contiguous to the gaol . . . was added to it in times of the Usurpation."

The Press Yard, or exercising ground, lay east of the Stone Hold, and the Lower Ward, in the Common Felons' Side on the ground-floor.

George Dance the elder made designs for a rebuilding of Newgate and Giltspur-street Compter, to be connected by a fresh gate across the street. His plans are illustrated in the *Universal Magazine* for April, 1764, and are also separately printed, on three sheets. In February, 1767, he was succeeded as City Surveyor by his son, George Dance, R.A., whom the Corporation employed upon the new works, they having obtained an Act in 1766 (followed by one in 1777) for raising subsidies in that behalf. The operations proved very costly. Excavation for brick vaulting was carried down to a depth of 40 ft. The first stone was laid on May 31, 1770, by Lord Mayor Beckford: in 1777 the last remaining portion of the old prison was pulled down. The new buildings were unfinished when pillaged and burnt, on June 6 and 7, 1780, by the "No Popery" rioters, who released all the prisoners, including their own comrades; and a further sum of 30,000*l.* was devoted to repairing and completing the fabric.

Dance's plans consist of a central block (formerly the Governor's residence) between two lodges in recesses, and two wings. The outer walls are nearly 4 ft. thick, and at the wings stand quite free from the buildings within. The top story of the Governor's house has replaced the angle-pediment of Dance's elevation as illustrated in Fergusson's "History of Architecture," Vol. iii. (edit. 1862), and Dance's designs did not include the east portion of the outer north wall, with the adjoining Ordinary's house in Newgate-street. The south or turnkeys' lodge, forms the usual entrance: the north lodge (which now contains the kitchen) is known as the "Debtors' Door," and there in the wall still remain the staples by which the scaffold was fastened. The "Iron Door" was made latterly, for admittance of the prison-van into the yard in which stands the block of cells, on the Felons', formerly the Debtors',

* William le Chamberlaine held in this neighbourhood thirteen acres, "No Man's Land," cited in Domesday.

* Four of the statues may be seen in the south wing of the prison.

Side, which rises above the outer wall.* On the north side of that block is part of the old Press Yard, its stones cut with two boundary marks of Christ Church and St. Sepulchre parishes. Behind the house is the chapel, standing on a vaulted arcade, and overlooking the Middle Yard, which lies between the South, or Women's, Yard, and the North, or Chapel, Yard, in which are the Visitors' Cage and a shed for the gallows. East of these is a block—in brick with stone dressings—of old wards, no longer used, three stories high. A passage leading along the east side of the Women's Side (south wing) to the Criminal Court is bounded by a length of the old City wall, wherein are cut the initials of some of the felons who are buried beneath the flagstones of the passage. The stones of the north wall of the Ward block bear traces of fire—a memorial of the rioters. The cells in the north wing were built in 1857-9, those in the south wing (Women's Side) three years later. Since 1882 Newgate has been used only for prisoners awaiting trial during Sessions, and for prisoners condemned to death. We may add that the design of George Dance the younger for Giltspur-street Compter (1787-91), was very similar to that for Newgate: the Compter was pulled down in 1855; its site has since been used as an open-air gymnasium for Christ Hospital.

Among the illustrations in the present issue will be found an elevation of the prison, together with a detail of part of the work to a larger scale, and sections of the cornice and other mouldings, from measured drawings made by Mr. G. J. J. Lacy. In the process of measuring the building Mr. Lacy noted one or two points which may be mentioned. The walls of the north and south bays are practically only screens; the wall at the north end acts as a protection to the brick front of the "New Prison" (the only portion now used for prisoners). The portion shown on the drawing, and standing above the north bay is faced with stone and continued down from the blocking course, till it is on a level with the blocking course of the solid screen front; below this level the rest of the New Prison is of brick. The upper portion, seen from the street, is thus in keeping with the whole, which could not have been the case if the brickwork of the New Prison had been carried up its full height.

The iron doors shown and noted on the drawing are very carefully modelled to imitate the stone-work, and the distinction between them and the stone is hardly noticeable except on a careful inspection. The filling-in of the voussoirs in most of the arches is peculiar in shape and quite worth study.

The gloomy appearance of the building is really, in a sense, an evidence of the thought and talent of the architect. He was commissioned to build a prison, and he modified the ordinary materials of Renaissance architecture in such a manner as to give them quite a new expression, and to intensify the fortress-like aspect proper to a prison. Newgate is in its way one of the most characteristic and powerful pieces of old London architecture, and in this sense it is to be regretted that in all probability we shall lose it before very long.

During the demolitions for making Holborn Viaduct, thirty-five years ago, the view of the prison, standing on the high ground, as seen from the valley below, was very fine.

* On the opening of Whitecross-street Prison in 1815, Newgate ceased to be used for debtors.

NOTES.

THE paper by Dr. Richter at the Institute on Monday night is a very valuable and interesting one, as those members who were not present will realise when they get the full text with the illustrations in the Institute *Journal*. One of the special points of interest treated of was the origin of the Ionic capital, and Dr. Richter brought forward anew the theory which has already been strongly pressed, and backed up by a host of illustrations, by an American author, Professor Goodyear. Dr. Richter's fewer and better selected illustrations made a stronger case for the lotus origin of the Ionic volute than was made by Professor Goodyear, who weakened his argument by not selecting his illustrations sufficiently; consequently Dr. Richter was more convincing, comparatively speaking, than Professor Goodyear; nevertheless we remain unconvinced. Mr. Alma-Tadema was perfectly right in calling attention to the important and radical difference between a volute which springs upwards from the necking, and one which springs downwards from the upper horizontal member of the capital. And the spiral of the Greek Ionic volute is distinctly geometrical in its character, and, as the President observed, has an obvious connexion with the spiral forms of ornament found at Mycenæ and Tiryns. Those, however, who wish to be in the latest archæological fashion will for some time to come have to think of the Ionic volute as a development from the Egyptian lotus. Archæological creeds are much more influenced by fashion than is commonly realised; and the lotus origin of the Ionic volute is the latest fashion.

THE speeches of the Duke of Devonshire and of Mr. Chamberlain at Birmingham have again directed public attention to the question of technical education. One thing, however, appears to become more and more clear, that the time has arrived for a more systematic teaching under State control. The spasmodic and in some instances amateurish attempts at technical education by local bodies with the grants at their disposal, can do little really and permanently to create a system of technical education which will benefit the nation. In this respect, our insularity is great: the bulk of the population of the country have no idea as to the state of technical instruction on the Continent, or to what extent it strengthens foreign competition with Great Britain. Such demonstrations as those at Birmingham are most important in a popularly governed country such as ours, where no great and substantial movement of any kind is possible without some popular force which has to be created.

A VERY important industrial exhibition is to be held in London next year, at the People's Palace, under the title of "The East London Trades, Industries, and Arts Exhibition." It will be divided into six main sections, as follows:—(1) Exhibits of Manufacturing and Trading Firms; (2) Work of Individual Craftsmen; (3) Exhibits by Individual Students and Apprentices; (4) Exhibits by Students collectively and by Institutions; (5) Women's Work; (6) Loan Exhibits of Works of Art. Section 3 is confined to persons under twenty-one years of age, and a certificate will be required from a teacher or a foreman to the effect that the work is the genuine production of the exhibitor. We regard these two sections of individual work, 2 and 3, and Section 2 especially, as the most important portion of the proposed exhibition. The formation of a special section for women's work is generally a popular feature in such an exhibition, and in regard to those branches of industry which are pursued only by women no doubt there is a good reason for it, but it ought to be confined to those. In the schedule no class of work is specified, as it is in regard to the other sections. Giving a special position to women in work which is also done by men has always proved to be a mistake; as is very conclusively shown in the case of art exhibitions of women's work only, which have always resulted in the collection of a number of works the majority of which would have had no chance of admission to a general exhibition. It is much better, in all trades or arts in which both men and women can work, that they should compete on equal terms and without any sex distinction. But of the general interest attaching to such an exhibition as is proposed there can be no question, and we hope it will prove a great success. The exhibition is to be opened in June. The Prince of Wales is Honorary President.

FROM a prospectus which is being widely circulated, we gather that a company is being "promoted" to build the new opera-house at the Haymarket, with certain adjuncts, whilst a second company is to be formed to act as lessees. Besides the theatre proper, there are to be numerous shops, an arcade and restaurant, a club, and some chambers on the site, though we can scarcely understand how the plan appended to the prospectus can ever be accepted by the London County Council unless the present theatre regulations are specially relaxed to meet the case, and a gross injustice done to those who of late years have gone to no inconsiderable expense to comply with the official code. The County Council no doubt has powers to relax certain of its regulations, but a most injudicious and dangerous precedent would be given, if, for instance, rule No. 6 were modified. This rule prohibits shops in the theatre block proper, and yet this plan shows an extraordinary intermingling of shops, theatre staircases and exits, &c. No matter what "fire-resisting" materials may be used to separate the shops and offices from the theatre proper, the danger of panic through an outbreak of fire in these adjuncts remains, and likewise the danger of smoke. The existence of the shops also spoils opportunities for clear exits, and compels the complicated and more dangerous planning of the staircases. In this "modern scheme" we actually find staircases which have no direct air and ventilation, whilst the bends and turns are anything but reassuring. A theatre carried out at the present day as proposed in this plan would be an absolute anachronism.

IN regard to the question of the relation of the architectural and engineering professions, and the view which has sometimes been expressed recently, in this country, that they should never have been separated, it is of interest to note that in the Berlin "Architekten-Verein," which has hitherto consisted of two sections, one for architects and one for engineers and surveyors, it has just been determined that this distinction is unnecessary and inconvenient, and the division has been cancelled. There will, however, be two specialist committees of seven members each, to attend to any special interests in connexion with what the Berlin Society has evidently determined to regard as two branches of the same profession. What would the "Memorialists" say to this?

THE new "Hofburg" at Vienna—or rather the new wing of the old Hofburg, which is part of the extensive group of Imperial buildings jointly designed by the late Gottfried Semper and Baron Hasenauer—has now been roofed in. The scaffold is to be struck on the occasion of the Emperor's jubilee, and the interior has to be ready by 1900. The works are at present being carried out under the supervision of Messrs. Hofer & Gruber, who are Baron Hasenauer's successors, and Herr Bartelmus is acting as clerk of works, which, in this case, means being chief of a large technical department. The building will be one of the most massive structures in Europe, the size of the blocks of freestone being quite unusual, frequently as much as seven cubic mètres. Stone from the Mazzaner quarries has been used for the principal entablature. The building is so situated as to have its main frontage on a large quadrangle, and its rear elevation looking on to the Emperor's private grounds. The apartments of the Emperor and Empress face these grounds, and are situated on the first-floor. The large reception-rooms are on the same level, but face the quadrangle. The

superficial area which the new Hofburg takes up is 14,300 square mètres, or more than the new Town Hall at Vienna.

THE Fine Arts department in Paris is proposing the erection of a monument to Delacroix at Saint-Maurice, his native place. The decoration of the new Mairies of Alfortville, Perreux, Issy-les-Moulineaux, and Suresnes is also under consideration. The last-named scheme will probably be the subject of an important competition among painters during the coming year.

THE Edinburgh Corporation are to be congratulated on the phenomenal success of their electrical supply works. Although they only began working some eight months ago, yet already the electric lighting committee have recommended that the existing plant be practically doubled. It is probable that, after paying all working expenses and allowing for interest and depreciation, there will be a profit of about 3,000*l.* on the first year's working. Professor Kennedy, in a recently-issued report on the working of the scheme, has made some remarks which are of more than local interest, as they concern the vexed 200-volt supply question. He says that, two years ago, when he was asked to design a scheme of electric supply, there were no satisfactory 200-volt lamps to be had, but he chose a system in which full advantage of these lamps could be taken, if ever they came on the market. He considers that satisfactory 200-volt lamps can now be obtained, and he hopes that the Corporation will soon be supplying current at twice their present voltage, *i.e.*, 230 volts. As to the difficulty of changing the lamps, he makes the following suggestions. The undertakers should give notice that on and after a certain date, say February 1, 1896, their standard pressure will be 230 volts in respect to all new customers, and that on and after another certain date, say August 1, 1897, the new voltage will be the standard all over the system. Also, that at any time between these dates any consumer will be supplied with high-pressure lamps at 6d. each, in exchange for his old lamps, the effect being that the consumers would run their old lamps as long as possible, and then exchange them for new ones. He calculates that the total cost of this to the undertaking would be 670*l.*, in addition to the wages of the men changing the lamps. The great advantage of this change to the undertakers is obvious, practically quadrupling the capacity of some of their most expensive feeder-mains. In order to gild the pill he recommends that a substantial reduction, either in the nominal price of the unit or the scale of discounts, should take place from the New Year.

WHILST admiring the ingenuity of the above-mentioned scheme for introducing high-pressure lamps, if we were consumers we would prefer our 115-volt lamps, and think that a reduction in our meter bill was dearly purchased at the cost of introducing a double pressure into our house wired for the lower voltage. Besides, the high-pressure lamps cost 1s. 6d. as against 1s. for the lower pressure. It is too early yet to state definitely the relative merits of the lamps, but there are several obvious drawbacks to the use of the high-pressure ones. In the first place, the filament is longer, and therefore the blackening of the lamp by the deposit of carbon must take place at a greater rate, and therefore the candle-power must deteriorate much more rapidly. There is double the chance of a weak spot in the filament, and hence the average life will be shorter. At first sight it would seem as if there would be danger of the filaments of the lamps short-circuiting and burning the lamp out if it were shaken, but practically all the lamps we tried survived this test, although we made the filaments spark across, and no doubt weakened them. However, we have given sufficient reasons to show that the high-pressure lamps must be inferior. For this reason, as well as for the more serious drawbacks we mentioned last week, which are endorsed by a letter from Major Flood Page in Tuesday's *Times*, we would strongly advise consumers not to be talked over into accepting a higher pressure of supply.

THE Report made by Dr. S. W. Wheaton to the Local Government Board, on the causes of an outbreak of enteric fever in the Quarry Bank Urban District, brings up again the old evil of polluted wells. The Report describes the condition of the houses which had been invaded by fever as unwholesome in almost every respect. The water-supply was in most instances obtained from draw-wells, situated close to houses and in the neighbourhood of leaking privies and defective drains, and steined with loose bricks only. The water from most of these wells has already been declared to be unfit for use by the Medical Officer of Health, and there is no doubt that they are subject to the most extensive pollution. The Report continues:—

"With regard to the disposal of excrement, the privy receptacles are in some instances merely holes in the ground, which are filled with liquid filth; in other instances they are of such faulty construction that the filth which accumulates beneath the seat does not become mixed with any ashes or other absorbent material. Overfull midden privies exist to a serious extent; and it would appear that before the outbreak of fever excremental accumulations of this sort had given rise to great nuisance, owing to the scavenging not having been performed at sufficiently frequent intervals. The ground around many of the houses is littered with excrement, which has in some instances been passed by persons actually suffering from enteric fever."

This is one of the worst accounts we have ever read in these Reports, which disclose so much evidence of dirt and disease in country districts where the natural conditions of health are so good, until they are spoiled by the ignorance of the inhabitants and the carelessness and neglect of so-called "Sanitary Authorities."

THE Sheffield Town Council have had two rather important subjects under discussion at their meeting last week. The one which excited most discussion was the question whether the Corporation should apply for an Act to authorise them to municipalise the tramways; a resolution in favour of doing so was carried by forty-eight votes to four. We should doubt the wisdom of the decision; the public are probably better served in such matters by private companies. The question of "the frost and water-carriage," which was the subject of a short discussion near the close of the sitting, is in reality a far more important one than the ownership of the tramways, especially if, as one gathers from the remarks of some of the speakers, there is any idea, on the part of some at least of the Sheffield Town Council, of taking so serious a step as abandoning the water-carriage system of drainage. At all events, one or two members spoke strongly in favour of such a course, and the result was that the Medical Officer of Health was instructed to prepare a report, including an opinion as to what system was best for Sheffield. It would be interesting to know the result of this report, but if the Town Council are led to abolish the water-carriage system in such a town as Sheffield, we should think they will make a grave mistake.

IT appears that there is an unusually high rate of infant mortality at Hackney Wick, and Dr. King Warry, the Medical Officer of Health, has been making an enquiry into the matter on special instructions from the Hackney Vestry. The enquiry unfortunately seems to indicate that there is not much chance of the state of things being improved, as it arises from causes one of which at least seems incidental to the position and nature of the site. Dr. Warry observes, indeed, that where there is a collection of persons in a state of poverty, there will always be a high rate of infant mortality, but in the case of Hackney Wick there is also the fact that the houses are built on soil formed of house refuse, supported on a bed of clay:—

"The impermeable stratum below retains the moisture in the superficial layers of soil, and as this latter contains a large quantity of organic matter, the ground air becomes damp and charged with organic and deleterious vapours, the products of decomposition. As most of the houses in this area stand immediately over the made soil, with only a few inches of air space intervening between it and the wooden ground floor—a concreted ground floor in this locality is a rarity—the atmosphere of the dwellings, especially at night, is vitiated, and produces a lowering effect upon the health of the inmates. Further, any defective drains or sewers allowing sewage to percolate into the soil in the vicinity of houses, will add further to the impurity of the ground air, and possibly by this means specific germs may be conveyed into the dwellings.

A third factor which must injuriously affect the public health in Hackney Wick is the unsatisfactory state of the sewers and drains with respect to fall. Even at ordinary times, *i.e.*, during dry weather, the sewage is standing in some of the Vestry's sewers at a varying distance from the outlets. This condition of things is much exaggerated during storms. Then the local outlets are entirely covered, the contents dammed back under great pressure, even to the house drains. As a result the soil becomes saturated with sewage."

There really seems no remedy but the demolition of the existing Hackney Wick, followed by the proper draining and concreting of the ground, before habitation on it is again entered on.

AN illustrated monograph of the Trinity Hospital at Mile End will shortly be issued by the publishing department of the Guild and School of Handicraft of Essex House, Bow. The monograph will be by Mr. Ashbee, and the illustrations by various members of the Committee for the Survey and Registration of Old Memorials of Greater London. The first edition will be limited to one thousand copies for subscribers, but we gather that the publication is not to be confined to the subscription edition. The special interest felt in the building at present justifies the publication, which comes at an opportune moment.

CONSIDERABLE interest has been aroused by statements in the daily press that on the pulling down of some old premises in Newton-street, High Holborn, for an extension of the Holborn Restaurant, the watch and seals "of Lord Lovat" were found in a chimney. On the seals are the initials, in cipher, "J. F.", with the Fraser crest and motto. But it is difficult to believe that the watch belonged to Simon Fraser, the "rebel Lord"; it is of silver, with Arabic numerals on the dial, and of the shape common in the latter half of last century; we are credibly informed that the hall-marks on the case are those of London for 1769-70.

THE fine ceiling painting executed by M. Puvis de Chavannes for the grand staircase at the Hôtel de Ville at Paris, representing "Victor Hugo offering his Lyre to the City of Paris," which was illustrated in the *Builder* of June 2, 1894, is to be engraved by M. Waltner, as a commission from the Municipality of Paris. It is to be executed as an etching "rehaussée de burin." M. Mordant is to engrave, by the same process, M. Besnard's central ceiling of the "Salon des Sciences"; and M. Lunois is to illustrate in lithography the two panels by M. Puvis de Chavannes, "L'Été" and "L'Hiver," in one of the Salons of the Hôtel de Ville. These illustrations of some of the principal decorative paintings of the Hôtel de Ville will be of considerable interest and value.

THE "Water-colour drawings in Holland and the South of England," by Mr. A. Weedon, on view at the Society of Fine Arts Gallery, are chiefly noticeable for the fine treatment of the sky in many of the drawings, as in "Approaching Storm, Katwijk" (5), "On the links at Sandwich,"

(9), and "Launching the boat" (39), a larger drawing than most of its companions, and which is a really grand composition. Among other especially good landscapes may be mentioned "Valley of the Aruns" (27), "Leyden" (37), "Boats arriving from the North Sea" (42), "The Old Rhine Leyden" (45), &c. Mr. Weedon works in a broad true water-colour style.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE third ordinary meeting of the present session of this Institute was held on Monday last, at 9, Conduit-street, Mr. F. C. Penrose, M.A., President, in the chair.

Examination for Associate.

The minutes of the last meeting having been taken as read,

The President announced that at the Final Examination, held from the 22nd to the 29th ult., sixty-eight persons had been examined simultaneously in London, Liverpool, and Bristol, with the result that thirty-five had passed and thirty-three had been relegated to their studies.

The names of the thirty-five who have passed, and are qualified for candidature as Associates are—

E. T. Allcock, Wakefield; H. W. Anderson, Wimbledon; J. D. Bland, Cambridge; W. Brand, Ipswich; C. S. Burgess, Edinburgh; J. McC. Cable, Brixton; E. F. Cobb, Strood, Rochester; E. R. Danford, Rotherham; E. R. O. Davis, Leicester; A. Down, Stockton Heath, Warrington; E. G. C. Down, Cardiff; H. H. Dunn, Lincoln; N. Fitzsimmons, Westminster; C. B. Flockton, Worksop; J. Ford, Samford; L. R. Ford, London; C. M. E. Hadfield, Sheffield; O. C. Hills, London; T. W. Hooley, Heaton Chapel; E. E. Jordan, London; G. C. Lawrence, Clifton, Bristol; H. Morton, Taunton; E. Nicholson, London; W. E K. Palmer, New Malden; G. M. Poole, Barrhead, N.B.; J. L. Redfern, Hanley; G. L. Sheppard, Worcester; G. R. Smith, South Shields; J. R. Smith, London; P. R. Smith, Richmond, Surrey; W. H. Steadman, Clifton, Bristol; A. Stratton, Liverpool; T. Turner, London; E. A. Whipham, Saltburn-by-the-Sea; K. Wood, South Shields.

"Græco-Phœnician Architecture in Cyprus."

Dr. Max Ohnefalsch-Richter then read a paper* on "Græco-Phœnician Archictecture in Cyprus, with special reference to the Origin and Development of the Ionic Volute." He first gave a description of the three Royal tombs discovered by him at Tamassos, in Cyprus. These sepulchres of a Græco-Phœnician type of architecture were, he maintained, of the seventh and sixth centuries B.C. A feature of peculiar interest in these subterranean stone buildings was the direct imitation in stone of constructions of wood, and this in a perfection which had never before been met with in remains of ancient monuments. Wooden columns, windows, locks, bolts, roofs were all reproduced in stone. He had found their counterparts surviving in modern buildings of Cypriote villages. The lecturer then proceeded to give reasons for his conclusion that the Ionic volute was derived from the Egyptian lotus-flower design, and that the same origin was traceable in regard to the Greek palmette and anthemion. The theory which would ascribe the origin of the Ionic volute to the Assyrian sacred palm-tree could no longer be maintained. A small clay model of a sanctuary—evidently a votive offering—discovered at Idalion, in Cyprus, some time ago, showed again the two lotus capitals on the columns supporting the porch. Some Hathor capitals discovered in Cyprus demonstrated the fact that Cyprian artists during the Græco-Phœnician period combined Egyptian, Assyrian, and Greek elements. On one of the columns was sculptured a design of a complicated lotus-tree with winged sphinxes. Dr. Ohnefalsch-Richter next referred to Herr Koldewey, a German architect, who had put forward a new theory, in his book, "Neandria," distinguishing between three classes of archaic capitals with curved volutes—the first, with crossed lines, the Cyprian; the second, with vertical volutes, called Æolian; and the third, with horizontal volutes, called Ionic. Those three he considered to be branches all growing out of the same trunk, which was of old Cappadocian origin, and which he declared to be the prototype. Herr Koldewey denied any connexion of the Ionic capital with Egypt or the Egyptian lotus-flower. Herr Puchstein, in his book on the Ionic capital, appeared to be of the same way of thinking. The Cappadocian columns of a baldachino from a rock-relief which had been put in evidence by the above-mentioned authors were extremely simple. The whole volute merely consisted of two spirals connected by a canalis and bent downward. In the upper line of the canalis of this Cappadocian capital Koldewey saw the horizontal tendency of the Ionic volute to be latent. The two spirals touched the vertical line of the shaft of the column, and in this fact Koldewey saw the vertical tendency of the Ionic volute in the same Cappadocian capital. Dr. Ohnefalsch-Richter, however, had found, during the excavations which he had carried out for the German Emperor, a small votive column even more regular and more simple than the Cappadocian column. The canalis above was horizontal and was covered already by an abacus. The spirals also touched the shaft with their inner and lower parts in a more finished and regular form than in the Cappadocian example. He maintained that the columns from Cappadocia, Cyprus, the oldest archaic Ionic volutes from Uyra, Olympia, and other places were simplifications of much more complicated Græco-Phœnician volutes, which on their part were derived from the Egyptian lotus. A reference to the architectural details of one of the three Royal tombs of Tamassos showed how a complicated lotus-design was changed into a more simple form, and thus prepared the way for the formation of the Hellenic Ionic volute. From an interesting series of Græco-Phœnician Cyprian capitals, with palmettes over the volutes, to which Dr. Ohnefalsch-Richter referred, he showed that the three types of capitals classified by Koldewey actually occurred in Cyprus. The Ionic volute, with its beautifully-ornamented cymation, which belonged to the archaic temple of Diana, at Ephesus, and which had been lately pieced together by Dr. A. S. Murray from fragments in the British Museum, he fully admitted to be the oldest existing example of a pure Hellenic Greek volute. He referred to Dr. Murray's paper, lately read before the Institute, showing the great importance of the Ephesian capital preserved at the British Museum, especially since its no less valuable twin-brother the well-known Samian capital had disappeared. As a last illustration, Dr. Ohnefalsch-Richter exhibited a photograph of an Ionic Greek capital now in the Cyprus museum at Nicosia, and discovered at Larnaca in 1879. In this case there was no ornamental cymation properly speaking. The sole decoration below the lower margin of the canalis and the spiral consisted of two palmettes or lotus-flowers growing out of the corners. The upper and lower margins of the canalis were not straight, but considerably concave, and both lines ran parallel to each other. The proportions of the capital were very harmonious and Greek, but it was difficult to date it. The concavity of the lines of the canalis seemed to point to a later date than the archaic Ephesian volute of the Artemisium.

Professor Aitchison proposed a vote of thanks to Dr. Richter, and prefaced his remarks by expressing his pleasure at seeing Mr. Falkener with them that evening. It would be imprudent on his part to say how long he had known Mr. Falkener, but he had always received the greatest kindness from that gentleman, as well as instruction from his admirable works, which had made his name celebrated through every architectural centre of the world. Referring to Dr. Richter's paper, he did not know when he had been present at a meeting of the Institute at which he had heard so profoundly interesting a paper. Everyone who had begun his architectural studies with the Classic must have taken the most profound interest in the Ionic order, and probably made theories of his own as to how it had originated. He must confess that his own theories on the subject appeared to have been far from the truth, for he had always supposed that the Greeks, being a maritime people, and living mostly on the sea-shore and on islands, must have taken their idea of the Ionic capital from the univalve shells, which they saw so plentifully about them. However, it seemed that the origin of the Ionic capital was not an animal but a vegetable one. The forget-me-not buds and opening ferns were striking illustrations of the plant spirals. Doubtless these discoveries lately made at Cyprus gave an overwhelming probability, even a possible proof, that the first idea of the Ionic capital came from the lotus. It would be interesting to have some examples of the spirals which the lotus flower formed. Like many theories, one could not at present carry it further, though when once suggested it carried an irresistible conviction to the mind. The canalis of the Ionic capital must, he thought, have been suggested by some of the shells they saw, but that would not affect the origin of it being from a plant, probably from the lotus. Dr. Richter had pointed out how wonderfully similar an example on his second sheet was to the celebrated internal capital of the Temple of Apollo at Bassæ. The way in which the abacus of this capital had been managed was one of the great marvels of the skill of the Greeks, almost everything they touched exhibiting the extraordinary qualities with which that great people were endowed. Dr. Richter had referred to mortar as being used in these graves at Cyprus. He (the speaker) when he went to Egypt was under the conviction that the Egyptians had not used mortar, but when he visited the great Pyramid of Gizeh he found every stone had mortar joints. In the chamber of the king and of the queen every joint of the great slabs which formed the roof were filled with mortar. He brought home specimens of this mortar, and, on having it analysed, found that the exterior mortar was composed mainly of lime and sand, while the interior mortar, although containing lime, was principally composed of plaster-of-Paris. The joints which had misled so many of the antiquaries into the belief that they were, like the Greek joints, dry, were simply a device to give a more elegant appearance to the masonry, while within the joints there was a channel on both stones, so that the mortar acted as a continuous tie between them. He, unfortunately had no acquaintance with Egyptian dates, but if, as he presumed, the Pyramids of Gizeh were very much older than 600 B.C., it was not surprising that mortar was found at Cyprus.

Sir H. Bulwer (late High Commissioner to Cyprus) said he had much pleasure in seconding the vote of thanks. The subject of the paper was so technical that he hardly liked to commit himself to any words about it, and certainly not to any expression of opinion. His acquaintance with the writer of the paper dated back a great many years, for when he went to Cyprus in 1886 Dr. Richter had already been there for some time. It was in Cyprus that Dr. Richter began his archæological education in the most practical manner, not in the schools or from lectures or books, but by practical investigation in that ancient and classic soil. Dr. Richter afterwards proceeded to Germany, and was there able to correct some of his earlier impressions, and to add to his knowledge. Whatever might be their conclusions on the question put before them that evening, viz., the origin of the Ionic volute, he for one did not pretend to offer any opinion, but they would be all agreed that they had heard a most interesting and suggestive paper.

Mr. Falkener remarked that he did not recollect having seen in Egypt examples of the Ionic column. He had discovered a Doric one, but had never seen any Ionic examples. He did not remember Dr. Richter saying anything about Lycia. Dr. Richter had mentioned that in Cyprus was to be found the imitation of woodwork in wood and stone buildings, but in Lycia the most perfect representations of woodwork existed in the monuments. Referring to the question of the mortar, it had brought to his mind monuments which had none, as in the Parthenon, where the joints were so fine that it appeared to be all marble. In Corinth, again, there were remarkable examples. The temple there was not in such a beautiful state of preservation as the Parthenon, for in Corinth a great number of holes had been bored into the columns, in order to find the small cramps in the centre. The paper, he considered, was an interesting and suggestive one.

Mr. Alma Tadema, R.A., said he had come there that evening to hear something about the origin of the Ionic volute. He had sometimes studied the question, and had always come to the conclusion that Cyprus was more or less a centre where outgoing streams of civilisation from the countries all around found root, and especially from Phœnicia. Greek influence also existed, but he had never seen his way to accept the idea, which was put forward a few years ago, that Cyprus might have had a great influence upon Greek civilisation and architecture. The capitals of the seventh and sixth centuries B.C. were

* This *résumé* of the paper, which has already appeared in the *Times*, was drawn up by Dr. Richter himself, and therefore we give it as his own expression of his views in an abbreviated form.

constructed as horizontal members, and he could hardly believe that architectural forms would go diametrically in opposition to an origin which was perpendicular. The principal form of the Ionic capital being horizontal, he could not get away from his first belief, that the Ionic capital had found its first idea in Assyria, and he was sorry that he had to sit down unconvinced by what Dr. Richter had said.

Mr. R. Phené Spiers said he had also formed theories as to the origin of the volute. He confessed it was somewhat difficult to contend against what had been said that evening, and there was no doubt that, when they had the paper before them, they would be in a better position to judge of the question. There was one direction in which Dr. Richter had not turned, viz., the metallic treatment of the ornaments which had been referred to. The drawings on the walls seemed to point to wooden construction translated into stone through beaten metal. He (the speaker) some time since had prepared a drawing which would illustrate what he referred to, showing a canopy which, it was surmised, was originally constructed in wood, and covered with metal. If the drawing was closely examined, it would be seen that the shaft was the trunk of a palm-tree. He believed that many of these examples were derived from metal forms beaten on to wooden structures, and he would draw attention to the fact of how the metal had played an important part in the decorative forms shown by Dr. Richter. These forms to his mind were all metallic forms. Where the records failed was due to the fact that all the features which were originally made in wood had entirely perished. The description given by Herodotus of the structures in Media, in Ecbatana, was that the palace had peristyles with columns in wood, covered with plates of silver. The dates of these might extend back long before the representation of the lotus in Egyptian decoration, or at least as far as 2500 B.C. The point he wished to insist on was, that it did not follow, because a certain decorative form was found at Egypt at some period, that some other nation under the same conditions had not actually invented the same forms.

Mr. Sydney Vacher said that Dr. Richter seemed to argue that the Ionic capital was traced from Egyptian work, but he would like to ask where he had found Phœnician work. One was always led to believe that the Phœnicians were an earlier nation than the Greeks, and, on examining the ornaments, it had always struck him that the early archaic Phœnician and Greek work must have come from the Assyrians. It was a difficult question to say whether Greco-Phœnician work came from Assyria or Egypt.

The President said they were extremely indebted to Dr. Richter for the very interesting and suggestive paper he had given them, upon a subject which was not yet wholly settled, though at the same time the lecturer had brought before them one of the elements for settling it. Dr. Richter had submitted, in a very interesting manner, additional evidence of the stone architecture which they knew so well, and of the final Greek work having originated from wooden construction. This, however, had been brought before them from another direction, in a work of the late Mr. Fergusson, who, in his introduction to the Antiquities of Ionia, said: "We now know practically, from our experience of Lycian tombs and Indian cave temples, what the process was by which the wooden style came into lithic architecture. At first it is by copying literally every detail of the carpentry—the tenons, the mortises, even the pins and fastenings are all reproduced in stone without any difference except in material. By slow degrees, sometimes after centuries, these wooden forms are gradually abandoned, and are replaced by others more suitable to the material, but seldom if ever without leaving such reminiscences of their origin as to enable anyone accustomed to such enquiry to tell at a glance their original parentage." Another point raised was the lime mortar, and that created no difficulty in understanding that in the very early palace at Mycenæ, the steps were rubble-stone, covered with very fine lime cement. These had been several times mended with the same material, so that although they did not show it as a rule, they knew perfectly well the use of lime. As to the origin of the Ionic capital, he believed this was one of the sources from which it had originated, but not the only one. The Greeks were open to suggestions from other sources, and they no doubt must have seen in the Phœnician buildings in Cyprus, and at Tyre and Sidon, works of this kind, as also some things in Egypt, though he was not aware of anything so nearly approaching the Ionic capital as the examples on the wall seemed to be. At the same time, they had a very distinct difference, which Mr. Alma Tadema had called attention to, viz., the horizontal character of the real Ionic, as compared with the semi-vertical character of the Cyprus examples. He believed it had originated in a different way, viz., from the very simple spiral used so frequently in the ornaments at Mycene and Tiryns, which were derived from Egypt, because there were examples of spiral work in Egyptian ornaments, like the ceiling at Orchomenus in Greece. In that case the spiral had equal developments at every turn, but then the Greek mind was always anxious for beauty, and the improvement went much nearer to Professor Aitchison's view of the expanding spiral shell. If they had had a volute of the exact form of the expanding shell, they would be kept to the equi-angular spiral. The curve used in the Ionic capital could be rendered, line for line, by a string carried round the first old-fashioned equi-distant spiral, which could itself be produced by a string carried round a cylinder. Having got that, they put the string on the spiral, and by this means produced their beautiful expanding spiral which formed the Ionic capital. This he had proved for himself, both in diagram and model. From the capitals of the Erectheum, the Propylæa and other examples, he had no doubt that the ultimate Ionic capital was so produced, but the original idea had been helped by those Phœnician forms, which probably came from Egypt or Assyria.

The vote of thanks was then put to the meeting and carried by acclamation.

Dr. Richter replied, and said that with regard to buildings of stone imitating wooden architecture, he was aware, so far as books were concerned, of what had been found in Asia Minor and other countries. When they saw the illustrations accompanying the printed paper, he believed they would admit that there existed nothing whatever like what had been found in these graves. He did not know anything similar of wooden architecture imitated in stone to the columns on the door, the windows, the sills, the locks, bolts, &c. With reference to Mr. Spiers' remarks, most of the works he (the speaker) could name were in metal, bronze, silver, and gold. As to the influence of Egypt and Assyria, the question was a very complicated one, and he could only touch upon it with a few words within the limits of his paper, though he could dwell for a week upon it. It should be remembered that Assyria did not exist by itself. At a certain period the lotus-flower pattern went from Egypt to Assyria; but the origin was in Egypt. Then there was the combination of the sacred trees, where also elements of the palm-tree were used, as appeared from Mr. Tylor's excellent paper. With regard to the Greek-Ionic volute, he had only desired to lay before his hearers the proposition that the Greeks had created their own art, but that one of the elements they used, and perhaps the principal element, was to be found in the lotus-flower.

The President announced that the next meeting of the Institute would be a business one on January 13, 1896, when the award of prizes and studentships would be announced.

The proceedings then terminated.

GLASGOW TECHNICAL COLLEGE:

THE ARCHITECTURAL DEPARTMENT.

THE medals and prizes won by the students of this department of the College at the recent Science, Art, and Technological Examinations were distributed on the 10th inst. by Mr. John Honeyman, A.R.S.A., F.R.I.B.A., the representative of the Glasgow Institute of Architects on the governing body of the College. Mr. Thomas Russell, of Ascog, presided.

After a statement had been made by Professor Gourlay as to the honours which had been won, Mr. Honeyman addressed the students, and said:—"There is one reason why I hardly regret the opportunity of briefly addressing you, and that is from the nature of the classes represented here. I feel that it is my duty to-night in one respect most heartily to congratulate you on the most excellent arrangements which exist in this College now, and the energy of my friend Professor Gourlay. I must congratulate you also on another point, that you had the good sense to avail yourselves of this opportunity. That is, I am glad to see, becoming more common, but it is not universal. Of course, I must congratulate those who have won the prizes, and I think the record which Professor Gourlay has read shows that these have been won with very great distinction, and reflect honour not only on you but on Professor Gourlay and his assistants. I congratulate you sincerely on that. Knowledge is power. There are two kinds of knowledge, that which we gain from other people's experience and that which we gain ourselves. A good deal is being said about shortening the years of apprenticeship, but I think you will find it true that it will be no gain to shorten the term of your apprenticeship. You must attain a certain amount of practical experience. The knowledge you get here is to help you to use that experience and to enlighten and enliven your intellect. When you are freed from ignorance about a great many things you will have more ability to grapple with the difficulties that arise. When I commenced business an apprentice was never set to work at all. He was set to learn what he now learns in the Technical College, and nowadays an apprentice is set to work at once. There is no profession where experience is really of more value than that of architecture, but I am sorry to say there is no profession where experience is less valued by those outside of it. There is a sort of idea (I address our architectural friends more particularly) that some seem to think that they can make our architects artists by teaching them an artistic style of drawing and colouring. Now this is a very great mistake and a delusion. The essential characteristic of a good architectural drawing is that it should be perfectly intelligible."

Mr. Honeyman then distributed the prizes. Mr. David Thomson, architect, then addressed the meeting, and referred, as a past-teacher, to the development of such classes.

A hearty vote of thanks to Mr. Honeyman was proposed by Mr. T. L. Watson, F.R.I.B.A., President of the Glasgow Institute of Architects, and a similar vote of thanks to the Chairman, proposed by Mr. Malcolm Stark, jun., Honorary-President of the Glasgow Architectural Association, concluded the meeting.

An exhibition of "Testimonies of Study" was held in the architectural studio of the College that day. The drawings were those which had been accepted in the three examinations of the Royal Institute of British Architects, and were executed by students of the College, who had passed the examinations.

THE CONSETT IRONWORKS.

ON Wednesday the members of the Northern Architectural Association, which has its headquarters at Newcastle, paid a visit to the Consett Ironworks.

These works, originally established in 1840, are situate at Consett, about midway between Newcastle and Durham, on the Derwent Valley Branch of the North-Eastern Railway.

The staple trade is iron and steel plates, steel angles, bars, &c., beside which the company are large coal-owners and manufacturers of coke, both for consumption at their own blast-furnaces and for sale.

The company's blast-furnace plant consists of seven furnaces, 55 ft. high by 20 ft. diameter of bosh, equipped with Cowper's and Whitwell's fire-brick stoves for heating the blast, which enters the furnaces at a temperature of about 1,300 deg. Fahr. There are four pairs of beam-engines for raising the blast for the furnaces. At present five furnaces are in blast, producing Bessemer pig-iron, of which the average yield per furnace is about 750 tons weekly, but as much as 919 tons in a week have been obtained from one furnace.

The largest proportion of the iron ore used is procured from the company's mines near Bilbao, in Spain, but quantities of other high-class minerals are also used in conjunction therewith.

The waste gases are utilised for heating the stoves, and in raising the steam for driving the blast-engines. There are altogether some thirty-one boilers in connexion with the blast-furnaces, nineteen of them egg-ended, and twelve double tubular.

When iron plates were exclusively used for shipbuilding purposes the plant of the company was almost entirely devoted to the manufacture of plates of this material, and for this purpose they had 170 puddling-furnaces and 7 plate-mills, and turned out about 1,900 tons of iron ship-plates weekly, but with the large substitution of steel for iron some portions of this plant have become obsolete, whilst others have been modified for the purpose of producing steel, and at the present time there are only forty puddling-furnaces and two plate-mills for the production of iron plates. These latter are at the old "tin-mill"

works, at which place also iron chequered plates are rolled.

The company commenced the manufacture of Siemens steel in the year 1883 in a small way at first, gradually extending their operations until they have now three steel melting shops, with a total of 25 melting-furnaces, the ingot-producing capacity of which is 5,300 tons per week.

The valve-chamber at the north shop is a special feature, being of unusually large dimensions, with sufficient room for walking round the valves, and space for a railway, which runs the entire length of the chamber and is used for taking the necessary material in and out. The casting-pits are parallel with the lines of melting-furnaces, and in front of the latter. Each melting-furnace has its own ladle and carriage. The ladle is dried by means of gas from the producers, and is always in readiness so soon as the charge is melted.

Large locomotive cranes are employed in the melting-shops in lifting the "moulds" into the pit ready for receiving the molten steel from the ladles, in stripping the moulds from the ingots, and in removing the latter for manipulation in the cogging and rolling mills. The gas-producers are at the back of the melting-furnaces and below the level of the latter. They are of the ordinary Siemens type, blown with steam, and the gas is conveyed from them to the melting-furnaces by overhead tubing. A special feature in connexion with the producers at the north melting-shop (angle mills) is the railway facilities, which are designed with a view to enable the coal to be brought to them without shunting.

There are two cogging-mills for dealing with the plate ingots after leaving the adjacent melting-shops. No. 4 cogging-mill plant, which is capable of cogging 2,000 tons of steel ingots weekly, consists of a 45-in. mill and engines for driving it, together with hydraulic slab-shears and engines and seven heating furnaces.

The company have four plate-mills for steel plates (Nos. 1, 2, 3, and 4). Each of these plate-mills has one stand of roughing and one stand of finishing-rolls, driven by separate high-pressure, direct-acting, non-condensing, fly-wheel engines. Nos. 2 and 4 mills are "reverse-mills." Nos. 1 and 3 pulling-over mills, a steam-lift being provided to each, whereby slabs weighing twenty to twenty-five cwts. each can be dealt with. Steel chequered plates are made at No. 3 mill. Steel plates of a light character are rolled at Nos. 1 and 3 mills, those of medium thickness at No. 2 mill, and the largest and heaviest plates in No. 4 mill. A short time ago the company rolled in No. 4 mill, for a West Hartlepool ship-builder, some plates of very large area, the finished dimensions being 60 ft. 2 in. by 4 ft. 2 in. by $\frac{11}{20}$ in. thickness. On the receiving side of the finishing-rolls of No. 4 mill there is an arrangement of live rollers, and on the delivery side of the same a traversing platform is provided for carrying the plates in process of manufacture from the roughing to the finishing-rolls. The average weekly production of finished steel plates in this mill alone is about 1,100 tons.

The angle-mills, which are of recent construction, are contiguous to the north melting-shop, and cover an area of about 16 acres. They are provided with the most modern plant and machinery, consisting of a 45-in. cogging-mill, with bloom cutting-shear; a 32-in., a 22-in., and a 12-in. guide-mill, all with their necessary engines, live roller gear, billet-skids, heating-furnaces, boilers, hydraulic plant, overhead cranes, hot-saws, billet and scrap cutting-shears, bar-banks and bar-skids, together with the other needful accessories, the whole being designed for a production of 1,500 tons; sectional steel of every description, such as angles, tees, bulbs, channels, girders, round and square bars, &c.

The company have also a laboratory with necessary apparatus for the examination of materials received and produced in the operations connected with the various manufacturing processes, a "test-house," containing three Bucton's testing-machines, tensile test preparing machines, powerful bending and drilling machines, and all necessary appliances for carrying out the tests required by Lloyd's, Bureau Veritas, Board of Trade, Admiralty, and other surveys. At the brickworks, 120,000 bricks are turned out per week; ordinary fire-bricks, blast-furnace lumps, and other firebrick articles used in the various departments are made here.

The company own about 2,700 cottages at Consett, Blackhill, Leadgate, and the outlying districts, and recently have commenced the construction of an entirely new village which will consist of between 300 and 400 houses of various types at Chopwell. They employ upwards of 6,000 hands, the wages at present paid amounting to about 416,000*l.* per annum. Mr. George Ainsworth is general works manager, and Mr. Henry Holliday secretary to the company.

EXPERIMENTS IN SEWAGE PURIFICATION.

A DISCUSSION on sewage purification took place at the Sanitary Institute on the 11th inst., when Sir Benjamin Baker, Pres.I.C.E., presided, Sir Douglas Galton opening the discussion by reading a paper entitled "Lessons to be learnt from the Experimental Investigations by the State Board of Health of Massachusetts upon the Purification of Sewage." The paper reviewed the experiments of Schloessing, Frankland, Warrington, Bailey Denton, and Baldwin Latham, and the results of mechanical filtration by the Lowcock and other English processes up to the point where the Massachusetts experiments with sand filters commenced. The early experiments of the Board as summed up by Mr. Hasen, the chemist to the experiments, showed that the power of any material to purify sewage, depended almost entirely upon its ability to hold the sewage in contact with air. The material must hold both air and sewage in sufficient amounts. Mr. Lowcock and Mr. Scott Moncrieff in this country, and Mr. George Waring in America, had succeeded in constructing filtering-tanks which gave excellent results, working effectively and permanently with hundreds of thousands of gallons of sewage passing through them annually. In the American experiments it was found that the thin layers of sand on the top of the aërators were, at the last, black with sulphides, but all the materials below were sweet and clean. All the impurities had been detained and destroyed. It was found that practically all the solid matters were deposited in the central core during the downward flow of the water, and that very little work remained to be done as the liquid rose in the outside ring. This was the case even when the sewage was applied at the maximum rate of 8,950,194 gallons per acre with the water moving through the tank at the rate of about 3 ft. per hour. The American sanitary engineer, Mr. G. Waring, in these experiments carried out at Newport, U.S.A., in 1894, had pursued the investigation on a practical scale, with a somewhat different arrangement from Mr. Lowcock's. The main features in both were the "strainer" and the "aërator," the function of the strainers being mere mechanical sedimentation. At the beginning of the experiments the effluent showed little or no improvement. Gradually, however, the organisms of nitrification began to multiply and to seize upon the dissolved impurities, destroying their organic character, and transforming them into nitrites and nitrates, in which unobjectionable form they escaped. Once started, this action continued and increased rapidly, and by the end of the month the average rate of nitrification was reached. From that time to the end of the experiment the operation of the tank was practically constant. At the end, when the tanks were taken apart, the conditions clearly indicated that the usefulness of the filters had been in no way impaired, that they were capable of performing their functions indefinitely, and that, under proper management, no renewal of the filtering medium would be necessary. The principal conclusions to which the experiments led were—

1. The suspended matters of sewers (sludge) can be mechanically withheld by straining slowly through suitable material.

2. The filth accumulated by this straining material can be destroyed, and the straining medium restored to a clean condition by mere aëration.

3. The successive alternate operations of fouling and cleansing can be carried on indefinitely without renewal of the straining material.

4. The purification obtained by this straining process practically equals that accomplished by chemical precipitation, and is sufficient to admit of discharge into any considerable body of water not used as a source of domestic supply, or for manufacturing purposes requiring great purity.

5. Such filters can be maintained in *constant* and *efficient* operation by suitable aëration.

6. The erection of a plant capable of purifying large volumes of sewage upon a relatively small area calls for no costly construction. Repairs and renewals are merely nominal. The attendance required is but slight. There is no outlay for chemicals, &c. The only expense of mechanical operation is the driving of the blower or air-compressor.

7. The process admits of wide variation in the selection of filtering material, and nearly every community can find, in its local resources, something suitable for the purpose.

After a few words of compliment to the lecturer the Chairman called upon

Professor Corfield, who in opening the discussion said the Massachusetts experiments confirmed the prior English experiments, and, though they had gone further, it was in that confirmation that their chief value lay. Frankland, Bailey Denton, and Baldwin Latham had shown that sand and gravel would be a satisfactory medium of filtration if the sewage was made to pass through them, and so long as that was the case the results were found to be as good in the winter as in the summer. These results revealed nothing that had not previously been revealed in the results of the experiments made by the Sewage Committee of the British Association.

Mr. Lowcock agreed with Professor Corfield in regarding the results as only confirmatory. If in England they had had the same opportunities which had been given to Mr. Waring in America they would have had as good results. He was, of course, glad to see Mr. Waring confirming his own results. They had introduced some recent improvements which permitted of the cleaning of one small section of the beds at a time while the rest of the filter was at work. In comparing results, the different characteristics of the sewage treated should be considered. The sewage in Massachusetts was only of one-third the strength of that at Wolverhampton, which was altogether abnormal. At Malvern Link where the sewage was strong but more constant than at Wolverhampton, the oxidation amounted to 99 per cent. of the oxygen consumed. In their filters a thin layer was skimmed off about every six weeks. This was first put on a platform to dry, then turned over, and in ten days it was perfectly clean.

Mr. Scott Moncreiff said that when he began his investigations he had not before him the Massachusset's experiments, and he had to adopt plans of his own. These plans he still continued. The main results referred to in Sir D. Galton's paper would, he believed, be viewed in a very different light in a short period. Some of these results would, no doubt, always remain of great importance, but in the near future it would certainly be held that biological processes were unsatisfactory unless the whole of the contents of the filters were completely dealt with, so that all the organic matter became liquefied, and no sludge of any kind remained.

Dr. Rideal referred to the very various functions performed by apparatus to which the term filter was applied. He thought the term misleading when applied to such processes as Mr. Waring's and Mr. Lowcock's. It would be better to adopt Mr. Waring's words, "strainer and aërator." It was very important to form a clear idea of what the process of nitrification was. That term should not be applied to the preliminary process of breaking down the organic matter, as it too often was.

Mr. Binnie, Engineer of the London County Council, who was next called upon, said that Mr. Dibdin and himself had been compelled to give very serious attention to this subject in trying to find out how to get rid of 180,000,000 tons of sewage annually with the least possible nuisance. They had carefully considered the Massachusetts experiments and others which had been made in the same direction, and they had come to the conclusion that no filter would get rid of 2,000,000 tons of sludge or of the 200,000 tons of dry solid matter they had to deal with. They had been experimenting many months to discover a material through which they could with the greatest effect and economy pass their effluent. They thought that it was necessary in some way or other to force in a large amount of oxygen, but their first attempts did not succeed much better than a similar attempt of his predecessor Sir J. Bazalgette, who had water mixed with sewage continually pumped up over and over again in order to expose it to the air. Mr. Dibdin and he had tried to force air into the sewage—in fact, to make soda-water of it, but still they found no great improvement. After many experiments they came to the conclusion that it was not only necessary to bring the sewage into contact with air, but that this must be done under peculiar circumstances. The surface of exposure must be very large, it must be kept wet, and the flow should be properly regulated. Their first nine months'

experiments were mainly directed to finding the best material through which to pass the effluent (not the sludge). They wanted to remove a large quantity of organic matter, and they came to the conclusion that coke-breeze was the best material. They constructed a filter of one statute acre in extent, and the results had been made public by Mr. Dibdin. In the bottom was formed an ordinary tile drain, covered with about 2 ft. 6 in. of coke breeze, and 6 in. or 8 in. of sand on the top of that to prevent the coke from floating out. The strainer was filled as rapidly as possible, and then they drew off. The water was drawn off through the interstices of the coke, but as fast as it was drawn off air went in to take its place, and they had no necessity for any air-pump. They thus treated 2,000,000 of gallons from which they had eliminated 75 per cent. of the organic matter, and obtained a sewage effluent perfectly unimpeachable. It had no taste and no smell, but they had evidently not quite perfectly done their work. They found subsequently a growth from end to end of *vorticelli*. Thus Nature completed their operations. At present, they were sending back into the Thames an effluent as pure as the water of the river itself.

Sir Douglas Galton very briefly replied, stating that the discussion had fulfilled the purpose he hoped to obtain. He never supposed it would apply to London. Any system applicable to London would necessarily be of a very special character, but he thought it had been shown that the process adopted by Mr. Lowcock in England or that by Mr. Waring in America, if introduced into the various provincial towns of England, would prove to be an economical method of treating sewage. A vote of thanks was accorded to Sir Benjamin Baker for presiding, on the motion of Mr. Rogers Field.

AN AUSTRALIAN OPINION ON TILES AND SLATES.

THE following remarks are from a paper on "Roof Coverings," recently read before the Engineering Association of New South Wales, by Mr. James Nangle :—

"In a good roof-tile, the chief consideration is lightness as far as is consistent with homogeneity of substance; for it is to be remembered that to prevent the soakage of water, a fine-grained, compact, almost vitrified body, free from impurities, must be produced. This result is only obtained by judicious selection, and sufficient weathering of suitable clays, thorough grinding, and kneading, and what is equally important, careful burning. Those of the foreign make give evidence of plenty of weathering and working, but at the same time, are not, as a whole, very compact, being filled with elongated crevices, between what might be called layers or fibres. The layers are very distinct, and indicate a very tough clay. The colour is very uniform, while the design is undoubtedly ingenious, and admits of most effective fixing, and security against the inroads of the weather. The table which has been prepared by the author shows the results of some experiments as to the water-soakage of these, as well as other tiles, compared with slates. Several varieties of English-made tiles are to be obtained, and some which have been brought under the notice of the author, attain to the standard of a good average. The best, though certainly not of a pleasing red colour, are at the same time possessed of an extremely compact body, uniformly burnt, and capable of very effective resistance to water. It is to be feared, however, that these tiles, while almost perfect in other directions, are liable to crack under the process of rapidly-changing temperature. The colonial manufacture are made heavier, and show absence of clay weathering, as well as the presence of a full supply of impurities, though it may be remarked they do not attain to such a large water absorption as some of the imported tiles. There is nevertheless a much larger soakage than can be good, especially as the impurities present are most likely to be acted on by the water, to the destruction of the tile. The colonial tiles would, it might be suggested, be the better if less in thickness and a greater degree of burning. Exceptionally good raw materials are to be found for tile-making, and it only needs some encouragement for the production of better tiles. Some of the tiles produced in years gone by were very carelessly made, and the result by using them so disappointing that their manufacture and extended use was grievously retarded. The entry of the imported article, together with the improvements of our buildings, has awakened and given fresh life to the industry, and we are likely to have a vastly better article from our own manufacturers.

Amongst all the materials which we are accustomed to use in covering out-buildings, none can excel a good slate, possessing, as it does in such an eminent degree, all the chief qualifications to fit it for the purpose. It is almost proof against water; it is not influenced in a great degree by contaminated atmosphere, stands change of atmosphere as well as most other materials, and, while obtained in abundance, is easily manipulated by the workmen, and looks well on the roof. It is, of course, to be marked that a good slate is so described, for in common with all other things there are varieties in quality, and we have only to look at some of the roofs around us to find slates, the quality of which is evidently very bad. Cases have passed under the notice of the author where slates, perhaps not more than ten or twelve years in use, have decayed to a state little better than brown paper. The source of such rottenness may be found in the large percentage of iron sulphide, the weathering of which has tended to utterly disintegrate the substance of the slate. If such slates were examined prior to being placed in exposure they would be found to be full of such impurities. Again, a slate which is soft and clayey, can no more endure than a piece of rotten sandstone—each will quickly crumble and collapse when subjected to the effects of the weather. The inferior kinds are found among those known as the common blue slate, obtained from America. A peculiar feature connected with the American slates is the want of uniformity in any one lot, and whether examined prior to fixing or after a few years' use, the great difference is most evident. Some weather well, others discolour, soften, and crack, and in a short time the slated surface is both unsightly and insecure. Whether this result is due to injudicious mixing of different qualities in commercial manipulation, or owing to great variety in the slate rock, is not clear. The same unfortunate trouble, during the practice of the author, has arisen when using what is looked upon as a better quality of American slate. Those from the Welsh quarries are, it is pleasing to note, almost entirely free from such defective qualities, and, if properly laid, only the greatest satisfaction can accrue from their use. The purple variety, though not more compact in grain than the blue, finds the most favour, and, if the evidence of experience can be taken into account, is certainly the best. Any iron present has been almost completely oxidised, thereby preventing troubles from this source, while the colour permits in most cases the arrangement of harmony in the effect of the structure. Many of the old colonial buildings were roofed with these slates, and on those which have survived, the slates will be found as good as the day they were put on. Colonial slate does not seem to offer much opposition to the imported article—indeed, it would be rather difficult to obtain any colonial roofing-slates at the present time. That there is good slate for the purpose in this, as in the other colonies, has been amply demonstrated, and there is enough to justify the opinion, that if the quarries were properly developed, our buildings might have more colonial slate on them than they have at the present time."

The following is the table of water-soakage of tiles and slates, referred to in the first paragraph of the above extract, which may be of interest to our readers :—

TABLE SHOWING ABSORPTION OF WATER BY DIFFERENT VARIETIES OF ROOFING TILES AND SLATES USED IN SYDNEY.

Specimens thoroughly dried prior to immersion. Time of immersion, 24 hours.

No. of Specimen.	Description.	Size.	Weight Dry in lbs. and ozs.	Weight Wet in lbs. and ozs.	Absorption in ozs.	Percentage of Porosity.	Weight per Square Wet in lbs.	Remarks.
			lbs. ozs.	lbs. ozs.	ozs.			
1	Foreign Terra-cotta Corrugated Tiles.	9¾ in. by 1 ft. 4¼ in. by 7-16 in.	4 10	5 9	15	20·27	751	Completely saturated at expiration of immersion. Light Red Colour.
2			4 14	5 12½	14½	18·58		
3			5 2	6 0¼	14¼	17·37		
4			4 9	5 8	15	20·54		
5			5 2⅛	6 1	14½	17·57		
6			5 3⅛	6 0	12½	14·97		
7	Colonial Terra-cotta Corrugated Tiles same pattern as Foreign Manufacture.	9¾ in. by 1 ft. 4¼ in. by 11-1 in.	6 14	7 10	12	10·90	1,063	Completely Saturated. Full Red Colour.
8			7 3½	8 1	13½	11·68		
9			7 3½	8 1	13½	11·68		
10			7 12½	8 11	14½	11·64		
11	English-made Tiles.	10½ in. by 6⅝ in. by ½ in.	2 10	2 13½	3½	8·33	1,495	Hard—Close Grained — Partially vitrified. Dark Red Colour.
12			2 6	2 9	3	7·89		
13			2 9	2 13	4	9·75		
14			2 9	2 11½	2½	6·09		
15			2 8½	2 10	1½	3·70		
16			2 10½	2 14	3½	8·23		
17	English-made Tiles.	10½ in. by 6⅞ in. by 7-16.	2 5	2 6	1	2·70	1,254	Very hard—vitrified—dark red or brown in colour. Section showed after immersion very little water penetration. NOTE. Brown Colo'red Tiles showed smallest absorption.
18			2 4	2 4¾	—¾	2·08		
19			2 3	2 4	1	2·85		
20			2 4	2 4½	—½	1·38		
21			2 4½	2 6½	2	5·47		
22			2 2	2 2½	—½	1·47		
23	Bangor Purple Slates.	20 in. by 10 in.	2 15	2 15½	—½	1·06	580	Very closed-grained and compact. Slate completely dried in 45 min. in a temperature of 65 deg.
24			3 4	3 4¼	—¼	·48		
25			3 1	3 1½	—½	1·04		
26			3 12	3 12⅝	—⅝	1·25		
27			3 0	3 0½	—½	1·04		
28			3 1	3 1¼	—¼	·51		
29	Common American Slates.	20 in. by 10 in.	4 0½	4 1½	1¼	1·94	653	
30			3 15⅝	4 0¼	1	1·56		
31			4 1⅝	4 3	1½	2·29		
32			4 4½	4 5	—¾	1·09		
33			3 3½	3 5½	2	3·38		
34			4 3½	4 4½	—¾	1·11		

COMPETITIONS.

TECHNICAL SCHOOLS, HYDE, CHESHIRE.—The Technical Instruction Committee of the Borough of Hyde, Cheshire, has recently decided a limited competition in designs for a new Technical School and Free Library. Five architects were invited to send in designs for competition, and those submitted by Messrs. Woodhouse & Willoughby, 100, King-street, Manchester, were successful.

COUNTY INTERMEDIATE SCHOOLS, WELSHPOOL.—The Governors of the County Intermediate Schools at Welshpool have entrusted the firm of Messrs. Woodhouse & Willoughby, of Manchester, with the duty of assessing the competitive designs for their new School Buildings.

CHURCH, HETTON-LE-HOLE, DURHAM.—In the competition for a new church, Hetton-le-Hole, nine firms of architects sent in plans, and the decision of the committee has resulted in the selection of the designs of Mr. Stephen Piper, architect, of Newcastle-on-Tyne.

ARCHÆOLOGICAL SOCIETIES.

LONDON AND MIDDLESEX ARCHÆOLOGICAL SOCIETY.—An evening meeting of this Society was held on the 10th inst., at the London Institution, Finsbury Circus, when Mr. E. J. Barron, F.R.S., Vice-President, occupied the chair.—Mr. J. H. Lloyd read a paper on "Portraits of some City Notables of the Stuart period." The paper was illustrated by a number of oil portraits, which Mr. Lloyd said had been collected or copied about sixty years ago by an artist of considerable reputation (whose name, unfortunately, did not transpire), but he considered it his mission in life to collect these portraits of leading men in the time of the Stuarts, and he thus collected no fewer than 160 of them. Of these, 120 were those of clergymen who were ejected by the Act

e

Accepted Design for St. Oswald's Church, Fulham. Messrs. A. J. Hopkins and W. V. Aspen, Architects.

of 1662. The artist required 5,000*l.* for the collection, but he died a disappointed man. Some time ago these oil paintings were announced for sale in the market-place, by a small dealer in the City of Exeter, when he (Mr. Lloyd) bought the entire collection, and thinking that the 120 clergymen, if they were hung at all, should be hung together, he presented them to the Mansfield College, Oxford. Those that he exhibited to the meeting that evening were portraits of men who had been connected, at one time or another, with the City of London. The collection included portraits of Oliver Cromwell (probably the last one painted of him); Sir Edward Coke; Sir John Eliot, Vice-Admiral of Devon, who was eventually imprisoned in the Tower, where he died in 1632; John Hampden; John Bradshaw (President of the Court which sentenced Charles I.); and William Kiffen, founder of the English Baptist denomination. Mr. Cecil T. Davis next exhibited and read a paper on "English Fire Insurance Tablets," a large number of which were shown on the walls and tables. The earliest mention of them, he said, was in 1680, when there was one representing a Phœnix, but the name of the office was then known as the "Fire Office." Signs were in those days used instead of numbers. The tablets were formerly placed on the fronts of houses that people might know who were insured. The firemen also were able to distinguish those insured, while each did his best to save the house which bore the mark or tablet of his office. The oldest tablets were made of lead, and those of later date were of copper and iron. Mr. Davis then described the various tablets exhibited and their distinctive features. Votes of thanks to the lecturers closed the proceedings.

ST. OSWALD'S CHURCH, FULHAM.

WE illustrate the accepted design for this Church selected in a limited competition. Owing to the position of the site, the building is placed north and south. It will accommodate 750 persons. The materials will be red brick and stone, roof covered with green slates. The organ-chamber is carried as high as the plate of the chancel-roof, and has an additional opening at the level of the clearstory windows. The turret stairs lead to the bell-chamber, and also give access to heating-chamber, &c., beneath; the choir vestry is placed beneath the sanctuary, with access from area steps as well as from clergy vestry.

The joint authors of the design are Messrs. Alfred J. Hopkins and W. Valentyne Aspen, the former of whom will superintend the erection of the building. The perspective was drawn by Mr. C. W. English.

Illustrations.

MARBLE SCREEN, S. LORENZO, ROME.

THE screen is fixed at the east end of the church, which was the entrance of the original early Christian building, but reversed in the thirteenth century by Honorius III., who added the nave and raised the floor of the east end as at present, by half burying the old columns. This seems the time when the screen and throne were erected behind the high altar, and corresponds with the time of the Cosmati family, who have given their name to this class of mosaic.

The throne is raised five steps above the floor of the apse, in front of the tomb of Pope Pius IX. The whole is of white marble, with delicate mouldings and carving, and is an excellent example of the Cosmati work, being inlaid with glass mosaic and panels of porphyry, green serpentine, &c. There is a great deal of gold in the mosaic, which by age has, in many places, lost its lustre and gained many dull tints of green and brown, adding to the colour-effect of the whole. The stars round the rectangular panels, which in the monotone reproduction appear lighter than the remainder, are all of this gilded glass. The coloured smalti are a rich red, a light and very dark blue, and some green. White cubes are also employed, but these are of marble, like the general work. The effect of the twisted columns, of which there are many examples of this period, is much emphasised by being richly inlaid with a great variety of patterns, and is very decorative and beautiful.

ALFRED H. HART.

MEASURED DRAWINGS OF NEWGATE.

THESE illustrations form a portion of a set of measured drawings by Mr. G. J. J. Lacy, for which the first silver medal for measured drawings was awarded by the Royal Academy in 1893.

Some remarks on the history and architecture of Newgate Prison will be found in the third article in the present issue, p. 455.

PROPOSED HOUSE, POULTON, GLOUCESTERSHIRE.

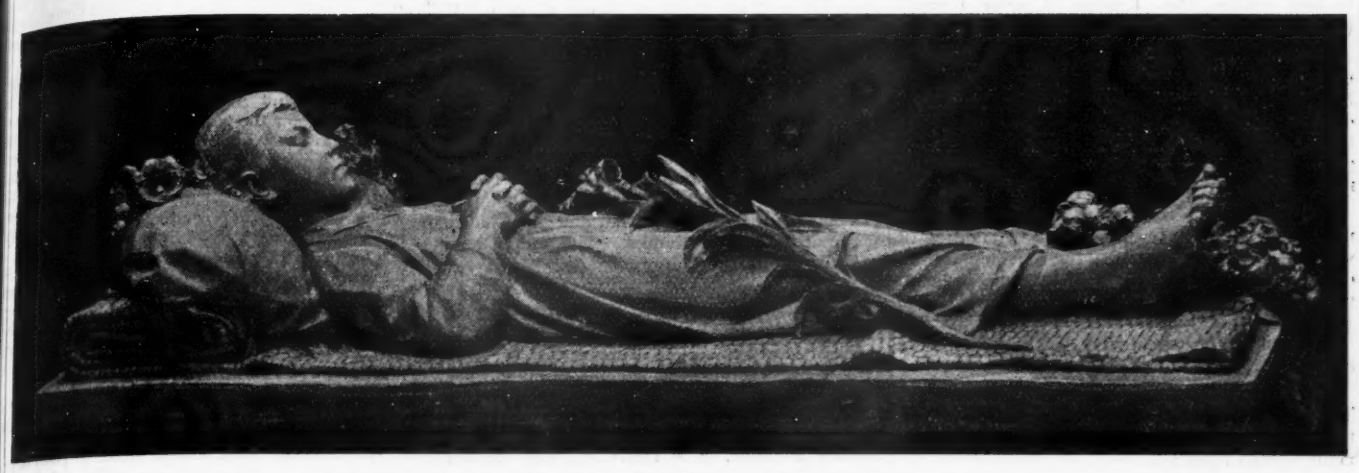
THIS house was designed for Mr. James Joicey, and intended to be built at Poulton, near Fairfield, Gloucestershire, in the local stone, on a level site standing rather high, from which the land slopes to the south-west. It is planned for future extension, it being proposed to add a large drawing-room in the south-west corner, with additional bedrooms over it. The Hall was to be carried up to the level of the bedroom corridor, and is the only portion of the house intended to be treated with any elaboration of detail or decoration, the rest of the work being perfectly simple. The kitchen, servants' hall, scullery, &c., are placed on the north side of the house; the first-named being lighted by a large skylight in addition to the window on the west side. There are no rooms over the kitchen, scullery, or dairy. There are five bedrooms (one for servants), a dining-room, bathroom, &c., on the first floor. Other servants' rooms are placed in the attic story in the west wing; while a bedroom for men-servants is placed over the hall (*i.e.*, in the square tower). I proposed to cover the roof with the stone slates common to that part of the country.

CHARLES J. BLOMFIELD.

STOREY'S GATE, S.W.

THIS fine site, which is approached from Princes-street and Old Queen-street, Westminster, and abuts on St. James's Park, is exceptional in having entrances available for carriage approach in a Royal park. The lease was acquired by Major J. A. S. Cuninghame, of the Household Brigade, and a syndicate of his friends were about to erect residential suites of the highest class. Our illustration, the original of which was hung in this year's Royal Academy, shows the intended façade to St. James's Park, and is an instance of construction to the maximum height allowed, and to meet other provisions, under the London Building Act, 1894.

The architect has endeavoured to give the



Recumbent Figure for the Harvey Memorial, Harberton Churchyard

building an appearance of solidity suggested by the character of adjacent architectural surroundings, such as the Foreign Offices, the Horse Guards, and the new Admiralty Offices, so far as was consistent with the requirements of family rooms *en suite*. The entire plinth is to be in rusticated white Portland ashlar, and the rest of the stone dressings in Doulting stone from Shepton Mallet, Somersetshire, relieved by red Ibstock facings. The roof, which will be constructed of rolled steel and concrete to a pitch of 75 deg., with a flat on the top, will be covered with green Westmoreland slates. The elevation will not be carried out entirely as illustrated, various alterations being necessitated in consequence of negotiations for several large lettings; for which reason the plan cannot at present be given, as it is in process of modification. In one such case the result has been the acquirement of the eastern half of the site by the Institution of Mechanical Engineers for the erection of a new Institution house, which will be of the same height but more Classic in character, while harmonising in design with the remainder of the block. This work has been entrusted to the superintendence of the same architect. Bills of quantities are being prepared by Messrs. Dunk & Bousfield, surveyors, of Billiter-square-buildings, E.C., and a contract for the superstructure will be entered into early in the coming year. The excavating and foundations are now being carried out by Mr. N. Fortescue, of Hackney; the clerk of works being Mr. W. Winteringham. Mr. Basil A. Slade is the architect.

FIGURE FOR THE HARVEY MEMORIAL, HARBERTON.

THE recumbent figure illustrated is a life-sized one, carved in statuary marble, and will stand upon the top of the solid marble sarcophagus in the midst of the Harvey Mausoleum, which, also built entirely of marble, has just been erected in the graveyard of St. Andrew's Parish Church at Harberton, in South Devon. The chapelle, or vault, measures 12 ft. by 12 ft., and is sunk 6 ft. in the ground. The chamber is approached from the eastern end by a flight of eight steps of grey Dartmoor granite. The entrance doorway has sliding double doors of massive gun-metal, and upon these occur the arms, crest, and motto of the family. Within, the floor, walls, and roof are not built up, but are each of thick slabs cut from unusually large blocks of marble. Projecting from the wall at the head of the figure is a shelf of veined and polished alabaster. The inscription, in inlaid metallic characters, at the foot of the marble casket, runs :—

ROBERT GODEFROY (TITO)
ELDEST SON OF ROBERT
AND ALIDA MARIA HARVEY
BORN AT IQUIQUE PERU
13 AUGUST 1884
DIED AT FONTHILL SCHOOL
EAST GRINSTEAD
21 MAY 1895

Above the ground the structure has continuous arcading around it to the height of about 4 ft. On the top of this is a large Calvary Cross, perfectly plain. Standing as it does on the brow of rising ground, this cross is seen in outline with good effect from several distant points of view.

The chapel, which is quite complete, has been erected under the superintendence of Mr. Tollit, of Totnes, architect to the Dundridge Estate. The recumbent figure will probably be *in situ* by Christmas. All the work is being carried out by Messrs. Harry Hems & Sons, of Exeter.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday, at the County Hall, Spring Gardens, Sir Arthur Arnold, Chairman, presiding.

Thames Steamboat Service.—The Rivers Committee reported as follows :—

"In accordance with the instructions of the Council we are considering the question of the best means of restoring to the Thames its old service as a highway. To enable us to advise the Council on the subject it is necessary to obtain certain information, particularly in reference to the street approaches to the river and piers. We therefore recommend that, subject to an estimate being submitted to the Council by the Finance Committee as required by the statute, the Engineer be authorised to engage the services of three temporary assistants for a period of four months, at weekly salaries not exceeding 4*l.* 4s. each."

Mr. E. White moved and Mr. Corbett seconded to refer the Report back to the Committee, in order that they might more fully disclose their object and intentions.

On a division the amendment was rejected by 62 to 46, and the Committee's recommendation was agreed to.

The Purchase of Tramways.—The Highways Committee recommended—

"That, inasmuch as the Highways Committee is at present disabled from negotiating with tramway companies, in consequence of the resolution of the Council of December 4, 1894, which limits the length of leases to be granted of undertakings purchased by the Council, the Committee be empowered to consider, without prejudice to that resolution, any proposals that may be made by the companies, and to submit recommendations thereon to the Council."

Mr. Beachcroft moved to omit the words "by the companies," at the end of the recommendations, so that any proposals, by whomsoever made, might be considered. This was agreed to.

The statutory resolutions were agreed to, directing the service of a notice upon the London Street Tramways Company for the purchase by the Council under the provisions of section 43 of the Tramways Act, 1870, the tramways and works and undertakings authorised by the company's Act of 1874, as altered and amended by the company's Acts of 1884, 1885, and 1887.

London Water-supply.—Mr. H. P. Harris brought up the report of the Parliamentary Committee, which contained the following recommendations :—

"(1) That her Majesty's Government be invited (*a*) To constitute by Act of Parliament, a public authority for the water area defined below; (*b*) To vest in such authority when constituted the powers now exercised by the metropolitan authorities under the Metropolis Water Acts in reference to the water companies, and certain of the powers now possessed by the Local Government Board with a view to improved administration and efficient control; (*c*) To confer upon such authority power to negotiate for the purchase of the respective undertakings of the water companies, and to give effect to such purchase in such manner as may be found expedient, and if thought fit to seek Parliamentary powers for the acquisition of the undertakings otherwise than by agreement, and for dealing with the whole question, including that of future supply.

(2) That pending the constitution of such authority, the Council do authorise negotiations to be initiated by the Parliamentary Committee with the water companies for the purchase of their undertakings.

(3) That with a view to the Council coming to a decision on the pressing question of new sources of supply as compared with a scheme of storage reservoirs, the Water Committee be instructed to report their final conclusions without delay."

The Committee suggested that the proposed public authority should be composed of members nominated by the Council, the City Corporation, and the Home Counties, with the addition of nominees of the Local Government Board, and of a sufficient number of co-opted members possessing special knowledge and qualifications. No doubt, they added, special provision would have to be made in any case, for such authorities as Croydon, Richmond, and Tottenham. The Committee's definition of the water area was—the City and Metropolitan Police District, covering 701 square miles, and outlying districts, embracing about 144 square miles.

Mr. McKinnon Wood, on recommendation (1), moved the following amendment :—

"That Her Majesty's Government be asked whether they will promote or assist legislation dealing with the Metropolitan Water Supply on the following lines :—That the entire control of the water supply within the area of the County of London shall be in the hands of the London consumers, directly represented by the County Council in conjunction with the City Corporation; that the consumers in the metropolitan water area outside the county shall not be denied or deprived of similar rights in their respective areas; and that the purchase price of the existing water undertakings shall not be assessed under the provisions of the Lands Clauses Consolidation Act, but shall be based upon the fair and reasonable value of those undertakings, due regard being had to the rights, special circumstances, and obligations of the companies; also that the Parliamentary Committee be instructed to report as to the reply of Her Majesty's Government immediately after the recess."

Mr. E. Spicer seconded the amendment, which, on a division, was agreed to, fifty-six voting for and forty-nine against. On the question that the amendment be the substantive motion there was another division, which resulted as follows, for, fifty-six; against, forty-three.

Mr. Stuart moved, and Dr. Collins seconded, to amend recommendation (2) by omitting the words "pending the constitution of such authority," and substituting "Water Committee" for "Parliamentary Committee."

The amendment was then adopted and the recommendation, as altered, was approved. Recommendation (3) was also adopted.

Fire Brigade Work.—On the recommendation of the Fire Brigade Committee it was agreed to sanction the execution by the Works Committee of the further work required at the Camberwell station.

By-laws, London County Council (Subways) Act, 1893.—The Highways Committee reported

that the Board of Trade had approved of the by-laws under the London County Council (Subways) Act, 1893.

Horseless Vehicles.—The same Committee recommended that the Parliamentary Committee be requested to ask the Government to reintroduce the Bill of the late Government for removing the existing restrictions on the use of mechanically propelled vehicles under two tons in weight. The recommendation was adopted.

Widening of Fulham-road.—On the recommendation of the Improvements Committee it was agreed to contribute on the usual conditions one-half of the net cost of the improvement proposed to be carried out by the Vestry of Fulham in the Fulham-road, between the free library and Wheatsheaf-alley, such contribution not to exceed the sum of 1,157*l.*

Gallery of Illustration.—The report of the Theatres and Music Halls Committee contained the following paragraph, the recommendations being agreed upon:—

"We have considered four drawings, dated September 12, 1895, showing certain alterations it is proposed to make at No. 14, Regent-street. The premises will be known as the Gallery of Illustration, and the hall, which is on the first floor over the show rooms of the Pneumatic Tyre Company, will accommodate about 350 persons, and will have a stage at the east end separated from the hall by a proscenium-wall. The proscenium opening will be fitted with a fire-proof curtain. On the second and third floors, over the saloon staircases and offices, are living rooms or flats with a separate exit-staircase. It is not intended to use the premises for stage-plays, and the drawings technically comply with the Council's regulations in regard to places to be used for concerts, &c., but as we greatly object to living-rooms and commercial premises being connected with a place of public entertainment we are of opinion that the Council should exercise the powers provided by Section 12 of the Metropolis Management and Building Acts Amendment Act, 1878, and attach conditions to the approval of such drawings to the effect that no factory, workshops, or repository shall be allowed underneath the hall, and that no dwelling-rooms shall be attached to the premises. We therefore recommend:—

'That the four drawings, dated September 12, 1895, be approved, upon the following conditions:—(*a*) That no factory, workshops, or repository be allowed underneath the hall; (*b*) That no dwelling-rooms be attached to the premises; (*c*) That iron doors be fitted to the openings between the stage and the dressing-rooms; (*d*) That the winders be removed from the dressing-room staircase. That the owner be informed that the works must be commenced within six months, and that the premises must be completed in all respects in accordance with the regulations of the Council, and the above conditions and the provisions of the London Building Act, 1894; that upon our reporting the completion of the building a certificate under the Metropolis Management and Building Acts Amendment Act, 1878, be sealed and issued to the owner of the premises, but that he be informed that the issue of such certificate will not preclude the Council from considering on its merits any application which may hereafter be made to it with respect to the licensing of the building for public entertainments.'"

The Council adjourned for the Christmas recess at half-past 8 o'clock.

ARCHITECTURAL SOCIETIES.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—The fifth general meeting of the current session of this Association was held on the 13th inst., when Mr. J. A. Gotch gave a most interesting account of the Renaissance in England, illustrating his remarks by numerous lantern slides.

THE GLASGOW ARCHITECTURAL ASSOCIATION.—A lecture was delivered in the rooms of this Association on Tuesday by Mr. James A. Morris, Ayr, on "Architecture: What is it?" The President, Mr. A. N. Paterson, M.A., was in the chair. Reference was made by the Chairman to the loss the Association had sustained in the death of Mr. Thomas Gildard, Hon. Member and Past Hon. President of the Association. Mr. Morris then read his paper, the main object of which was to urge that architecture was not merely the art of building and construction, any more than poetry was the art of grammar: that it was essentially a fine art, and not an occupation to be pursued as a business. A large number of lantern slides were shown in illustration of the lecture, which was considered to have been one of the best papers ever read before the Society. We may be able to give some of this paper on a future occasion.

ARCHITECTURAL ASSOCIATION: DISCUSSION SECTION AND CAMERA CLUB.—A combined meeting of these two bodies was held at the Rooms of the Association on Wednesday, Mr. Herbert A. Satchell in the chair. The paper was by Mr. E. W. M. Wonnacott, and dealt with the history of "Holland House." The author began his account by giving the local reference in Domesday Book, and described the growth of the buildings from the erection of the centre block and turrets (Cope Castle) in 1607 down to the recent additions by Col. Edis), mentioning, by the way, many of the notable personages with whose lives the house has been associated. The paper was illustrated by a series of 100 lantern views lent by Mr. Dixon; several drawings lent by Col. Edis, and some good photographs. Mr. Bertram N. Southall proposed, and Mr. W. Bonner Hopkins seconded; a vote of thanks to the author. Messrs. Garbutt and Brodie followed, and the Chairman then put the vote of thanks. The author having replied, the meeting terminated.

ENGINEERING SOCIETIES.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.—The opening meeting of the session of the Civil and Mechanical Engineers' Society was held on the 12th inst. at "The Ship" Restaurant, Charing Cross, under the presidency of Mr. Sydney à Court, A.M.Inst.C.E., who delivered his inaugural address as President, and took for his subject "Civil Engineering." After briefly reviewing the development of the science, he dilated more particularly on the necessity of those professing to be civil engineers being properly qualified, and strongly objected to any man who chose being allowed to call himself a "civil engineer." He was of opinion that if Parliament thought it necessary that a dentist should have a proper qualification for pulling out or stopping a tooth, that it was still more necessary that an engineer, on whose skill and ability the lives of many depended, should have proper qualifications, and that those who had not should be prevented from advertising themselves and making use of the name of the profession of those who had. Mr. à Court was also of opinion that the civil engineer should have a good general and theoretical, as well as practical education, enabling him to deal in a sound way with the matters that come before him, just as a properly-qualified medical man does with the cases that he has to deal with: he also alluded to the advantages of some men becoming specialists in certain branches of the profession, as in the medical and surgical professions. He pointed out the advisability of employing the civil engineer in all large buildings; he drew a distinction between the manufacturing engineer and the consulting engineer, and alluded to the advisability of those constructing works and inhabited buildings employing the consulting engineer and not trusting to the cheapest contractor for supplying, unchecked, the large amount of mechanical apparatus and devices connected with drainage, water supply, heating, lighting and the ventilation of all inhabited structures. A discussion of a most interesting character ensued, and was taken part in by the Past-President, Mr. C. T. Walrond, the Honorary Secretary, E. H. G. Brewster, and Messrs. R. Booth, H. Coward, William C. Street, W. M. Binny, and others.

Correspondence.

To the Editor of THE BUILDER.

SHOREDITCH BATHS AND LIBRARY COMPETITION.

SIR,—We are very glad to see your protest against the conditions of this competition, and the amount of work asked for from competitors.

We wrote a letter at an early stage of the competition pointing out that the ½-in. details asked for were not necessary in order to help an assessor to arrive at a decision, and that if it were necessary to require each competitor to send in a plan showing engineering details, the perspective might be omitted to somewhat reduce the immense labour of the competition.

The answer we obtained was that the matter had been considered by the Commissioners and assessors, and that it had been decided to retain them "in the interests of competitors!"

Now, as to the County Council requirements, if the large bath is used as a hall, the competitors were told in "replies to queries," that the London County Council might not require "strict conformity" with their regulations, but that competitors would have to guarantee that their designs would be passed by the Council, and "enquiries had better be made to ensure that this will be the case."

Now, Sir, we think everyone is aware how difficult it is to obtain definite information from an official department to meet a supposititious case. We tried to do so, but only received the reply that it would be wise to adhere to the regulations laid down, which we did, to the detriment of our design. All this would have been easily avoided if the instructions had contained a sketch-plan showing a few positions of the large hall, which would satisfy these modified requirements, and the Baths Commissioners and their assessor could have obtained this information with ease.

In the reply to the fourth query it is stated that the "ancient lights in adjoining streets must not be interfered with." Now, as the existing buildings on the site had for the most part been cleared, we wrote enquiring how high the buildings which faced Bowling Green Walk (which is 18 ft. 9 in. wide) had been, and we received a reply that "probably the vestry might know"; and later a reply was sent, which we enclose. No circular was ever sent round to us as promised!

The absurdity of calling on competitors to set back for ancient lights, when no information is given as to essential conditions which govern such cases, is too ridiculous to be insisted on. And what could be easier than to note all round the site-plan—"here, buildings must not exceed —— feet in height"?

But the length of the instructions is quite out of proportion to the amount of useful information contained in them.

We certainly shall always make a point of protesting against all conditions which ask for more than one-eighth scale drawings, with or without perspective, or one-sixteenth scale drawings, in which case it may sometimes be necessary to ask for a detail; and we hope others will do the same, as it is only by such protests that conditions such as those for Shoreditch will become a thing of the past.

HANNAFORD AND WILLS.

Swansea, December 16, 1895.

HOME, *SUITE* HOME! OR, FLATS IN PARIS.

SIR,—The Paris edition of the *New York Herald* publishes, December 9, an article on what it calls "Radical Transformation in Paris Life: Flats Preferred to Separate Houses." The headlines are misleading, as Parisians, except the very wealthiest of them, who occupy their *hôtels*, have lived in layers, one above the other, from time immemorial. What the *Herald* means to say is that these *hôtels* are being given up for what it calls "apartment-houses." This it states on the authority of Mr. Sprent, a Parisian house-agent, whom it has interviewed.

Mr. Sprent attributes the new departure to the influence of English and American families settled in Paris. These, by insisting on "*le confortable*," have got it, and their apartment-houses, full of modern improvements, have, he says, caused the *hôtel* built even so recently as ten years ago to be out of date now. He gives particulars of the rents of the new flats, which may interest Londoners. They seem high, but he thinks they may go down, even although ground-rents may go up.

"'Will the rents of these modern flats go higher still, Mr. Sprent?'

'I don't think so. In fact, I believe the utmost limit has been reached, and some people fancy it has been exceeded and that a general reduction will follow. During the last twenty years the rent of apartments in the fashionable quarters of Paris has nearly doubled. However, that is due almost entirely to the fact that the value of the ground has so considerably increased. Speaking of the rise in the value of land, I can warrant that every ten years there is an increase. It is regular as clockwork: there is a sort of stagnation period for a decade, and then up go prices. There is no doubt of that.'"

"Land in the fashionable quarters sells," says Mr. Sprent, "at about 8*l.* per foot superficial in the Avenue des Champs Elyseés, and at about 4*l.* in the Avenue du Bois de Boulogne. In the unfashionable quarters it has either fallen or stood still in value."

The *Herald* gives a plan of one floor of No. 82, Avenue des Champs Élyseés, a four-storied block, which the house-agent considers to be the finest apartment-house in Paris:—

"Each apartment in this house comprises an antechamber and *galerie*, two salons, billiard-room, eight bedrooms, six cabinets de toilette, bathroom, five water-closets, dining-room, office de salle-à-manger, servants'-hall, kitchen, wash-room, linen rooms, servants' rooms, cellars and stables and coachhouse. Each apartment has both gas and electric light, hot and cold water, steam-heating apparatus, lifts, electric bells, telephone, and dumb-waiters."

The entire block has been let to tenants of apparently the most substantial sort. The gross rent obtained is 4,920*l.* per annum, being, for the ground floor, 1,120*l.*, first floor 1,520*l.*, second floor, 1,200*l.*, third floor, 960*l.*, stables 120*l.* The names of the tenants are given.

The *Herald* also gives a plan and perspective sketch of another house, No. 104 in the same avenue. This is a corner site, and has the cupola which seems to be *de rigueur* for recent Parisian apartment-houses. There are three suites on each floor. The corner suites commanding the Champs Elysées are the dearest, next those at the side, and then some with a much inferior aspect, towards Washington street. There are six floors, and the rents asked average 1,000*l.* per annum for the corner suites, and about 800*l.* and 300*l.* respectively for the others. The gross rental of this block, if the prices asked are obtainable, will approach 13,000*l.* per annum.

If American newspapers were given to the practice of "booming" enterprises of this sort one might—but no, do not let me be so ungracious as to suggest

that either the owners of No. 104 or the energetic house-agent "got at" your contemporary; a thing which everybody knows to be impossible.

L. C. R.

The Student's Column.

METALS USED IN BUILDING.

XXIV. AND XXV.

STRENGTH (*continued*).

Of the various kinds of copper it is generally recognised that their tenacity is least when in the form of castings. Thus, according to American experimenters, the tenacity in tons per square inch of ordinary cast copper ranges from about 6 to 10; whilst Anderson found it to vary from 8·5 to 11·2. The tenacity of forged copper is materially increased by the addition of minute proportions of phosphorus to the metal. Forged copper in the ordinary state has a tenacity of about 13 to 16 tons per square inch, but with ·04 per cent. of phosphorus the tenacity rises to over 22 tons, and the strength is, practically, proportionate up to that amount. A very high result is obtained by hard copper wire, viz.—26 tons per square inch.

In regard to the strength of tin, that metal being chiefly used in alloys no particular attention has been paid to it separately. But Thurston gives its tenacity as ranging from 0·89 to 2·68 tons per square inch, and its co-efficient of elasticity as reaching 3,125. The same author gives the tenacity of cast bars of zinc as 2·0 to 2·9 tons per square inch; though Professor Unwin found only a tenacity of 1·1 to 1·5 tons. Sheet zinc is credited with having a tenacity of 7·14 tons per square inch. From the foregoing it will be noticed that copper has a much higher tenacity than either tin or zinc, and that of the two latter zinc is decidedly the stronger.

The behaviour of alloys of these metals, in regard to strength and other physical properties, is by no means governed by the relative proportions of the metals in the alloys. Or, rather, one could not arrive, theoretically, at the strength of an alloy from a consideration of the strength of its component metals. This will be readily understood from what has been said concerning the peculiar methods of union of these metals in alloys. Obviously, a great deal depends on the judicious manner, or otherwise, in which the alloy has been prepared with a view to the thorough union of the metals, and that without prejudice as to whether such union leads to true chemical alliance or merely a mechanical admixture.

The alloy known as steel-bronze has been carefully investigated in view of its general employment in the arts. The name is very misleading, seeing that steel-bronze has no iron in it, but merely refers to cast bronze which has obtained its utmost strength of resistance, equal to unchilled steel, by being subjected to a tension beyond the limit of its elasticity. If bronze containing from 6 to 8 per cent. of tin be cast in the usual way in thin pieces, when cool it will be tolerably homogeneous in all its parts; but if the castings be made thicker, the parts which come in contact with the mould will be found, on examination, to contain less tin, on account of the rapid decrease of temperature, and by crystallisation, to have forced the particles richer in tin before them, and produced, in combination with the more gradual process of cooling, a mixture of bronze with free particles of tin entirely wanting in the homogeneity on which the application of this metal to higher purposes principally depends. Two methods have been adopted to remedy this evil: one consists in subjecting the bronze, whilst in the molten state, to heavy pressure, until the metal is cold; in the other the molten bronze is run into a thick cast-iron mould and cooled very rapidly. It is stated that the quality of the metal produced by either of these means is about the same.

Yet the two processes are the reverse of each other, and it is difficult to understand that homogeneity results in either case. We know well enough that the application of pressure to a molten mass retards its cooling, but that is generally accompanied by partial crystallisation on a different plan to what would take place were it allowed to cool in the ordinary way. If very great pressure were applied it is conceivable that the molten mass would develop porphyritic structure on a small scale, and the crystals would assume a tabular rather than an acicular habit—to the immense improvement of the compressive strength of the metal when cold. On the other hand, when, as in the second process adverted to, the molten mass cools very rapidly, one would not suspect that that could be accompanied by a corresponding increase in strength, unless, indeed, steel-bronze is a peculiar exception to the rule. Rapid cooling generally means a want of thorough crystallisation, and in the vast majority of cases investigated, seeing that the surface of a large mass of molten material must cool quicker than at some depth within the mass, the class of crystallisation (if present at all, in the true sense of that term) developed on the surfaces open to the air must of necessity be different to that developed in the interior of the mass. It is inconceivable that such a mass could be really homogeneous, from a consideration of the most elementary laws in physics. Although the effective resistance to strain might by experiment be found to be somewhat similar, such result could not, we conceive, be due to the property of homogeneity, but rather to the inherent qualities of the alloy along two distinct lines of descent from the ordinary state of the metal.

In any event, from a commercial standpoint, the production of what is usually called a homogeneous mass (as seen by the naked eye) is the first improvement in bronze, and the first step towards steel-bronze. The second is straining the chilled bronze beyond the limit of its elasticity, because this metal does not obtain its "steel" properties in respect of strength, elasticity and hardness until it has been strained beyond this point. The following table compiled from the researches of General Uchatius by Herr Paulus* is interesting as giving the strength and other physical properties of various kinds of commercial bronzes.

Table showing the physical properties of different kinds of Bronze.

Alloy.	Absolute strength.	Limit of elasticity.	Elastic extension in ·0001.	Permanent extension per cent. of length.
	Per cent.	Tons per sq. in.		
Bronze containing 10 tin	32·128	10·794	174	1·5
,, ,, 8 ,,	33·017	8·889	140	2·5
,, ,, 6 ,,	34·668	8·254	128	3·5
,, ,, 10 ,, and 2 zinc.	19·175	3·810	89	0·5
Bronze containing 10 tin and 1 zinc.	26·477	6·349	120	0·7
Bronze containing 8⅓ tin and ½ zinc.	24·128	9·524	157	1·7

Herr Paulus suggests that not only bronze, but wrought-iron, steel, and doubtless all ductile metals, if stretched beyond the limit of their elasticity, would really attain a far greater limit. Thus, that of elasticity of chilled but unstretched bronze was reached with 2·54 tons per square in., the elastic tension being 0·004 of its length; whereas after the rod had been strained until its permanent extension was 0·004 of its length, its limit of elasticity was raised to 10·159 tons per square in. (*i.e.*, fourfold), and its elastic extension became 0·00192 of its length.

Many experiments to ascertain the strength of phosphor-bronze have been carried out. Speaking generally it may be said that that alloy possesses the advantage of not becoming crystalline under the action of repeated shocks and bends, and is, amongst other things, well adapted for wire rope. Clark's tables give the following values for phosphor-bronze wire. For unannealed wire about 0·6 in. in diameter, the lowest tenacity is 43·6, highest 71·2, and mean 56·3 tons per square inch; for annealed wire of the same character, but about 0·11 in. in diameter, the lowest tenacity is given as 22·6, highest 28·8, and mean 24·4 tons per square inch. Austrian experiments on phosphor-bronze bars gave the resistance at the point of elasticity as 19,857 lbs. per square inch, and the resistance at the point of rupture as 58,383 lbs. per square inch. Another series of experiments, made by General Uchatius, yielded 54,915 lbs. and 81,795 lbs. per square inch respectively.

The tensile strength of manganese-bronze, for rods rolled hot, varies from 29 to 39·60 tons per square inch; for plates rolled hot from 28·46 to 30·78 tons per square inch; and for the metal as cast under pressure, from 31·90 to 35 tons per square inch. The disparity of the results in some of the cases is due to the particular condition under which the metal, as tested, existed—according to whether it was annealed or delivered to the testing machine direct from the rolls; or whether it was pulled across or with the fibre.

* Organ für die Fortschritte des Eisenbahnwesens, Vol. xiii., p. 140.

Mr. P. M. Parsons has shown* the strength of certain varieties of manganese-bronze, by torsion, as follows:—

Manganese-Bronze—Torsion Tests.

Description of metal.	Diameter. Inches.	Twisting moments in inch pounds. Elastic limit.	Twisting moments in inch pounds. Breaking stress.	Amount of twist in length of one diameter, number of turns.	Remarks.
1. Cast under pressure..	0·622	1,170	3,360	0·183	Uniform twist.
2. Cast under pressure..	0·624	1,200	3,372	0·166	,, ,,
3. Rolled.....	0·621	1,110	2,880	0·175	Annealed.
4. Rod.....	0·621	1,580	3,242	0·165	Rolled hot; tested direct from rolls.

No. 3 was removed from the machine unbroken.

The transverse strength of manganese-bronze, as ascertained by the same author on a bar of the metal 1 in. square cast in sand, and placed on supports 12 in. apart, steady pressure being applied in the middle of the bar, was as follows:—With a deflection of ·025 in. the stress was found to be 896 lbs., when the bar had arrived at a deflection of ·06 in. it stood at 1,792 lbs., at ·21 in. 2,688 lbs., at 1·97 in. 4,144 lbs., and when the stress had reached 4,256 lbs. the bar gave way, but without breaking, bending to a right-angle.

No better series of tests as to strength and allied physical properties of brass could be quoted than those made by Professor Thurston for the United States Testing Board about seventeen years since, and set out in detail in the first volume of the Report of that body (which the student should consult for further particulars). Knowing the multitude of metals that pass by the name of brass in the market, the composition of each sample tested was ascertained, so that the results should apply to subtances of a specific nature, and so that the metallurgist, as well as the architect and engineer, should profit to the utmost, in the practical sense, from the elaborate investigations. In other respects, also, the tests made by the same accomplished experimenter are models of what such work should be:—

Strength, &c., of Brass.

Composition. Copper.	Composition. Zinc.	Density.	Co-efficient of bending strength. Tons per sq. in.	Co-efficient of elasticity. Tons per sq. in.	Tenacity. Tons per sq. in.	Elongation in 5 in. per cent.
82·5	17·5	8·63	10·35	6,440	14·55	26·7
80·0	20·0	8·60	9·46	5,567	14·59	31·4
75·0	25·0	8·53	9·97	5,985	13·62	35·8
70·0	30·0	8·44	10·92	6,265	13·62	29·2
65·0	35·0	8·37	12·70	6,175	16·88	37·7
60·0	40·0	8·41	17·40	5,461	18·33	20·7
55·0	45·0	8·28	18·95	4,258	19·77	15·3
50·0	50·0	8·29	14·94	5,167	13·84	5·0
45·0	55·0	—	21·63	6,261	10·78	0·8

Professor Unwin obtained† for ordinary brass used for machinery a tenacity of 10·43 to 11·62 tons per square inch, an extension of 13 to 22 per cent. in 8 inches, and a contraction of area of 16 to 27 per cent. The co-efficient of elasticity is about 5,080 for rolled brass. The same author, experimenting with delta-metal, ascertained that its tenacity was approximately as follows:—For cast-bars, from 17·05 to 23·79 tons per square inch; for a rolled bar 33·26 tons; for a ring cast whilst rotating, hammered cold, 39·75 tons per square inch. These results, however, are shorn of much practical value, as the actual composition of the metal is not quoted, and it is therefore impossible for anyone to know what kinds of delta-metal were employed in the tests. As the student already knows, delta-metal is, in general, an alloy of copper, zinc, iron, and phosphorus introduced to each other by special methods; but in some cases, to impart certain properties to it, tin, manganese, or lead are also employed. With such a range of composition possible it is highly desirable to give a quantitative analysis or assay so that one may glean some idea of the class of delta-metal experimented with.

The strength of lead is a difficult matter to ascertain satisfactorily except for tension; its tenacity is usually quoted as about 1 ton per square inch. It is such a soft metal, and so ductile, that attempts at arriving at its compressive resistance (as in certain other metals and

* "Trans. Cleveland Inst. of Engineers," Dec., 1888 also in Hiorn's "Mixed Metals," 1890, p. 209.

† "The Testing of Materials of Construction," 1888 p. 344.

many alloys) have usually ended in elaborate calculations as to the weight required to make it "flow," or to bulge in the centre when cylinders of lead are tested. In connexion with the last-mentioned property the experiments of Professor Kick* may be quoted. The results refer to a homogeneous lead cylinder the original height of which was 64·4 mm. and the diameter 50·05 mm. :—

Experiments with Lead Cylinders.

Experiment No.	Height in Millimètres.	Diameter in Millimètres.		Pressure in tons.
		Top & bottom.	Centre.	
1....	57·8	51	54	2·90
2....	47·6	53	60	3·25
3....	42·9	55	63	3·35
4....	40·9	56	65	3·45
5....	34·4	62	71	3·95
6....	28·2	69	79	5·65

As the outcome of these experiments the author made the important practical discovery that in a soft body, if the material can change its shape under pressure, its density will not be affected. Thus, with a very homogeneous cylinder of lead, the density, both before and after pressure, was 11·35, though the cylinder was reduced, during the process, to half its original height. It was found, also, that the density was but slightly increased by a sudden blow. A piece of pure lead was tried under a steam-hammer of 2½ tons, with a fall of 19 inches; the change in density was only from 11·354 to 11·376. The further result of the experiment was, that the shorter the time under pressure, the less was the deformation; and the more violent the blow the less the effect. The density above quoted, although said to refer to *pure* lead, is somewhat lower than the accepted density of the metal (namely 11·45), and is thus liable to the suspicion of not being quite pure. All base metals alloyed with lead lower its density. The co-efficient of expansion of lead is commonly stated to be ·00003 for each degree between 0 deg. and 100 deg. Cent.

THE great interest taken in recent years in aluminium has led to a fairly exhaustive series of testing experiments as to its various qualities, but none have received greater attention than the property of strength. As might be readily anticipated, these experiments hail principally from the United States.

It has been ascertained that under tension, aluminium is about as strong, section for section, as cast-iron, but when the fact is taken into consideration that pig-iron, or a similar part of wrought-iron or steel would weigh, section for section, three times as much as aluminium, the relative tensile strength of the metal assumes a further importance. The tensile strength is further increased by its being cold-rolled or cold-forged; and there are alloys which will not increase the specific gravity over, say, 3 or 3·25, which add very considerably to the tensile strength of the metal. For sections of structural work, where lightness is of importance, the metal has already found numerous applications in the building arts. Angles, plates, channels, and other sections of aluminium used in structural work, in commercial quantities, and the use of the metal in heavier pieces are the more recent developments of the metal for structural purposes.

The following table† gives the average results of many tests of commercial aluminium :—

Strength of Commercial Aluminium.

		lbs.
Elastic limit per square inch in tension.	Castings	6,500
	Sheet	12,500
	Wire	16,000 to 30,000
	Bars	14,000
Ultimate strength per square inch in tension.	Castings	15,000
	Sheet	24,000
	Wire	30,000 to 65,000
	Bars	28,000
Percentage of reduction of area in tension.	Castings	15
	Sheet	35
	Wire	60
	Bars	40
Elastic limit per square inch under compression in cylinders, with length twice the diameter.		35,500
Ultimate strength per square inch, ditto		12,000
The modulus of elasticity of cast aluminium is about—		11,000,000

Aluminium in castings can readily be strained says Mr. Hunt, to the unit stress of 1,500 lbs. per square inch in compression, and to 5,000 lbs. per square inch in tension. It is rather an open metal in its texture, and for cylinders to withstand pressure an increase in thickness over the ordinary formulæ should be given to allow for its porosity. Taking the tensile strength of aluminium in relation to its weight, it is as strong as steel of 80,000 lbs. per square inch. In this connexion the following table by Richards is useful :—

Weight compared with Strength of Metals.

Metals.	Weight per cubic foot.	Tensile strength per square inch.	Length of a bar able to support its own weight.
	lbs.		Feet.
Cast-iron.....	444	16,500	5,351
Ordinary Bronze ..	525	36,000	9,893
Wrought-iron.....	480	50,000	15,000
Hard structural steel	490	78,000	23,040
Aluminium	168	26,800	23,040

Under tortional stress in Thurston's machine the metal has much lower modulus of rigidity than iron or steel, its maximum shearing stress in castings being about 12,000, and in forgings about 16,000, being about that of pure copper. The angle of torsion is about equal to that of the softest steel.

Aluminium brass, an alloy prepared by adding spelter to aluminium-bronze, has a tensile strength of from 13 to 30 tons per square inch; the more bronze present the harder and stronger the brass. In regard to transverse stress a bar 1 in. square and 12 in. between supports broke with a load of 72 cwts. The form of aluminium brass, known as Hercules Metal, has a tensile strength varying from 30 to 40 tons per square inch, with an elongation of 10 to 30 per cent., according to composition of the metal.

Aluminium and nickel alloys are said to possess a tenacity of from 33 to 44 tons per square inch; tests by Kirkaldy gave results ranging from 39 to 42 tons per square inch.

METAL STATISTICS.

In order to give some idea of the British output of metals and non-metals used therewith, as raised in the United Kingdom, we may now give some brief statistics; but the student will understand that these figures by no means refer exclusively to metals used in building—it is impossible to separate them from others. The recent issue of the "Mineral Statistics of the United Kingdom for 1894" enables us, fortunately, to bring these particulars up to date as far as possible. The metals are considered in alphabetical order; all figures refer to the year 1894 :—

Alum Clay (*Bauxite*).—Raised exclusively in County Antrim, Ireland, from between sheets of Tertiary basalt—for (aluminium ore) refractory substances, &c. Quantity raised = 7,970 tons.; value at the mines = 5,618*l.*

Antimony Ore.—None produced in the United Kingdom during the year; in previous years small quantities were raised from veins in Scotland and North Cornwall.

Arsenic.—White oxide, a by-product obtained in preparing the tin and copper ores of Cornwall and Devon. Quantity, 4,801 tons; value = 48,614*l.*

Arsenical Pyrites.—Excluding pyrites used in making the oxide above-mentioned; raised in Cornwall and Devon. Quantity, 3,288 tons; value, 3,823*l.*

Cobalt and Nickel Ore.—No returns. The only mine recently worked in Great Britain is in Flintshire.

Copper.—This industry is rapidly decreasing in importance in Britain. In 1863 the production of copper ore and copper precipitate amounted to upwards of 210,000 tons, valued at over a million sterling; whereas in 1894 the production was only 5,994 tons, valued at 16,222*l.* This latter is divided as follows :—Copper ore, 5,752½ tons, metallic copper obtainable by smelting, 397 tons, value (at mines) = 13,909*l.* Copper precipitate 241½ tons, yielding metallic copper 49½ tons, value = 2,313*l.* It is noteworthy that during the year we imported copper largely, as follows :—Ore, 82,805 tons; regulus, 78,845 tons; old, 3,245 tons; unwrought and partly wrought, 57,051 tons; manufactured copper, value, 140,181*l.* The last-mentioned came principally from France and Holland; the largest amount of regulus and ore was sent to us from Spain; whilst the unwrought and partly wrought came mostly from the United States.

Fluor Spar.—This is a very fluctuating commodity obtained from Durham, Derbyshire, and Cornwall. Quantity 126 tons, value = 69*l.*

Gold.—It is not generally known that we are now raising quite a noticeable amount of gold. The returns refer exclusively to Merionethshire, and principally to the vicinity of Dolgelly. The value of the ore is the largest since 1888, when it was double as much as at present, though that year stands alone. Quantity of ore 6,603 tons, yielding 4,235 ounces of gold, estimated value = 13,573*l.* At bar gold prices the amount would yield 14,811*l.* By way of contrast, it may be observed that we imported, during the year, gold bullion and specie to the value of 27,572,347*l.*, and exported 15,647,551*l.*

Iron Ore.—The principal iron-producing districts at the present time are Cleveland or North Yorkshire, yielding over four millions of tons annually, and Cumberland and North Lancashire, with an output of nearly two and a-quarter millions tons. Open workings in Lincolnshire and Northamptonshire furnish a large quantity of cheaply-wrought brown iron ore. The ore raised in Scotland is chiefly "black-band ironstone." Totals—Iron ore, quantity, 12,367,308 tons, value = 3,190,647*l.*; Pig-iron obtainable, quantity, 4,347,472 tons, value, 9,999,186*l.*

Iron Pyrites.—We depend chiefly on Spain and Portugal for our sulphur-bearing minerals; the quantity raised at home is very small—principally from Warwickshire, Derbyshire, Carnarvonshire and Wicklow. Quantity, 15,523 tons, value = 8,042*l.*

Lead Ore.—Found largely in several counties, though the proportion from Ireland is very small (value only 367*l.*). The Isle of Man yielded more than Scotland and nearly as much as Wales by value, and about one-sixth of the whole of that raised in the United Kingdom. Totals:—Dressed lead ore, 40,599½ tons; obtainable by smelting, 29,687 tons; amount of silver obtainable from the lead, 275,696 ozs.; value of ore at mines, 266,995*l.*

Magnesium.—No statistics available.

Manganese Ore.—Principally from Merionethshire. Quantity, 1,809 tons; value = 740*l.* During the year we imported manganese ore to the value of 338,400*l.*

Ochre, Umber, &c.—Quantity, 8,516 tons; value = 14,040*l.*

Quicksilver.—None raised in the United Kingdom. Imports, principally from Spain, and in much lesser degree from Italy; quantity, 3,843,791 lbs.; value = 303,362*l.*

Silver.—All the silver of British origin is obtained from lead ores. Quantity, 275,696 ozs. value = 33,313*l.* Silver extracted from foreign cupreous iron pyrites, quantity, 311,413 ozs., value = 37,629*l.* Contrasting these figures with silver bullion and specie for the year, we imported 11,005,417*l.*, and exported 12,165,049*l.*

Tin Ore.—All the tin ore now raised in the United Kingdom comes from Cornwall, with the exception of a few tons from Devon. Quantity, Dressed ore (black tin), 12,910¼ tons; amount of tin obtainable by smelting, 8,327 tons 8 cwts.; value at the mines or works, 487,523*l.*; or, taking the value at the market average of English block tin in London, it would be worth 604,500*l.*; these are the lowest results that have been obtained for very many years. During the year we imported tin, principally from the Straits Settlements, to the value of 2,718,499*l.*

Uranium.—One mine in Cornwall; quantity, 19 tons; value = 815*l.*

Wolfram.—Two mines in Cornwall, neither of which produced any during the year. Contrast this with the year 1885, when 374 tons, valued at 4,799*l.*, or with 1892, when 125 tons, valued at 3,000*l.*, were raised.

Zinc Ore.—This is almost entirely blende, principally from Cumberland, parts of Wales, and the Isle of Man. Quantity, zinc ore, 21,821 tons, obtainable by smelting 8,130 tons; value at the mines, 67,311*l.* During the year we imported zinc ore, crude zinc, and manufactured zinc to the value of 1,373,262*l.*, principally from Holland, Belgium, and Germany.

GENERAL BUILDING NEWS.

READING SCHOOL BOARD.—The resolutions passed by the Board on June 12 and July 10 to obtain by competition plans for the school and buildings to be erected in the Swansea-road were rescinded at their meeting on the 11th inst., and it was decided that Mr. G. W. Webb, of Reading, be appointed to prepare plans, &c., for the new buildings. The schools are to accommodate 1,000 to 1,200 children on the class-room system with central halls; also a cookery centre for 54 scholars, a manual instruction centre for teaching metal- and wood-work, and playsheds for gymnastic apparatus, &c. The architect is also to report as to providing a swimming-bath in the basement of the schools.

RESTORATION OF COLEBROOKE CHURCH, DEVON.—The church, dedicated to St. Andrew,

* Abstract "Min. Proc. Inst. C.E.," Vol. l. (1877), p. 190.

† Mr. A. E. Hunt, in "Mineral Resources of the United States for 1892." 1893, p. 248.

was reopened on November 30, after partial restoration, comprising the re-seating and necessary work in connexion therewith, including the removal of the modern west gallery, which completely blocked up the fine tower arch and cut off the tower, with its west doorway and window, from the rest of the church. Although much of the seating consisted of the usual high deal pews, there were many remains of fifteenth-century oak-seats with richly-carved bench-ends. These have been carefully repaired and restored, and all the oak not thoroughly decayed has been utilised as far as practicable. The rest of the seating is constructed of English oak, and designed in keeping with the old work. Among the remains of old oak-seating there was an interesting sixteenth-century carved oak prayer-desk, which has been carefully repaired, and will be again used as a prayer-desk. The whole of the works have been carried out by Messrs. W. Dart & Son, contractors, Crediton, under the direction of Messrs. Tait & Harvey, architects, Exeter.

RESTORATION OF RANGEMORE CHURCH, STAFFORDSHIRE. — The new chancel of Rangemore Church was consecrated on the 7th inst. by the Bishop of Lichfield. The edifice was built twenty-eight years ago from the design of Mr. Butterfield, and consisted of nave and chancel. In 1884 Lord Burton added an aisle on the south side in memory of his father, the founder of the church, stained-glass windows also being inserted, with the same object, by the tenantry and villagers. The old chancel has now been replaced by a longer and loftier one, in fourteenth-century style, the work being English in character. The walls externally are of Coxbench, with Hollington stone-dressings, and the interior is of white Hollington. The chief feature in the design of the chancel is that the altar is placed in a deep recess, which has a stone-vaulted roof, supported by ribs carved and moulded, and is further embellished by two stone-carved figures of St. Augustine and St. Aidan, placed at a considerable elevation north and south of the altar. The windows are filled with stained glass. The floor is of black and white marble, varied in design, with solid black marble steps, some of the patterns being copied from the Church of St. Anastasia, at Verona. The reredos is of alabaster, and reaches to the sill of the east window. It consists of three panels. In the centre is represented the crucifixion, with St. Mary and St. John on either side, while in the two smaller panels stands the figure of a bishop under a carved canopy. The whole is surrounded by a carved border of grapes and foliage. The altar has the legal ornaments of cross, vases, and candlesticks of gilt metal. The choir stalls are carved in oak. The vestry has been enlarged and refitted in oak. Hoptonwood stone has replaced the Minton tiles in the nave; while a new oak pulpit, with panelling at the back and extensive carving, and steps and base of Purbeck marble, has been introduced. The outlay involved by the alterations is about 4,000*l*. The work was designed by and carried out under the superintendence of Mr. Bodley, A.R.A., and the chief contractors were Messrs. Rudd & Son, of Grantham, Mr. Bridgman, of Lichfield, being responsible for the carved oak work for the ceiling and the stone figures, and Mr. Hodges (Burton) for the nave floor.

BLACKWALL TUNNEL WORKS.—The following works at the Blackwall Tunnel are finished, namely, the sewers on both sides of the river, the fire-proof fence and the approach road at Messrs. Forbes, Abbott, & Lennard's premises at Ordnance-wharf, and the Northumberland-wharf river wall. The caissons for all the shafts are now sunk to their final level. In the cast-iron-lined part of the tunnel one ring has been erected during the past month. This completes the cast-iron lining beneath the river between shafts Nos. 2 and 3. The shield is in position to start out from the north side of No. 2 caisson, and the plug is being removed. Nine cast-iron rings have been placed temporarily across No. 2 shaft, so as to give the shield an abutment to push from. On the south side of the river the cut-and-cover work is completed, and on the north shore, out of a total distance of 436 ft., a length of about 380 ft. is finished, and the remainder is formed up to springing. The total approximate cost of the work executed up to the end of November last is 567,316*l*., of which the sum of 10,096*l*. represents the value of the work done on the raised approach road, the cost of the work carried out during the month being estimated at 1,645*l*. The work of widening Blackwall-lane and Trafalgar-road is now finished with the exception of some York paving on the south side of the latter thoroughfare, and this, it is believed, will be completed in the course of a week or two. The whole of the carriageway has been opened to traffic.

BOARD SCHOOL, CARDIFF.—New Board School buildings have just been erected in Howard-gardens, Cardiff. The structure now the offices of the Board, and which fronts to Howard-gardens, was originally two villa residences. On the ground floor are the clerk's and general offices; on the first floor the Board-room, inspector's office, &c.; and on the second floor the school attendance officers' offices, the superintendent's offices, &c. A central gable has been erected which has been carried out in the Perpendicular style to accord with part of the old portions. In addition to these offices, there is in course of erection at the rear a large building to be used for the purposes of a pupil teachers' school, art school, and gymnasium. The school will be 126 ft. long by 42 ft. wide, two stories in height, and the gymnasium will measure 42 ft. long by 38 ft. wide. There will be four class-rooms, capable of holding 50 persons each, and in connexion with the art class-rooms there will be a clay-modelling department. Adjoining the gymnasium will be a students' workshop, where youths will be taught the use of lathes and carpenters' tools and machinery, as well as in various other branches of technical instruction. The architects are Messrs. J. P. Jones, Richards, and Budgen, Cardiff; the contractor is Mr. Henry Davies, Cardiff; and the clerk of works, Mr. David Evans.

CHURCH, GATESHEAD.—The foundation-stone of the new Church of St. George, Durham-road, in the parish of Christ Church, Gateshead, was laid on the 16th inst. by Lord Northbourne. The building is being erected at a cost of 5,900*l*., including the tower. The accommodation is for 630 adults. The church consists of chancel, nave, north and south transepts and aisles, and organ-chamber, with choir and clergy vestries on the south side. The latter are arranged so that they may be used as one room for meetings, and have an entrance from Inskip-terrace. The nave is 27 ft. wide by 49 ft. to the ridge, divided into five bays, with narrow aisles, and without a clearstory. There are three entrances, the principal being that at the south-west angle, through the tower. The exterior walling is of local stone, sneck-faced, and the interior piers and arches are of stone, chisel-dressed, the general finishing being plaster. The floors of the nave will be of wood, with wood-block flooring in the passages. The floor of the chancel will be covered with encaustic tiles. The windows will be filled with tinted cathedral glass in leaded lights; and the heating is to be by hot water, on the low-pressure system. Mr. Stephen Piper, Newcastle, is the architect, his plans having been selected in a limited competition, in which Mr. W. Walton-Wilson was the assessor. The contractor is Mr. Alexander Pringle, of Gateshead, and Mr. Richley is acting as clerk of the works.

PREMISES, STOWMARKET.—The Stowmarket Charity Trustees are building premises at Stowmarket from the designs of Mr. Henry Geo. Bishop. Messrs. Andrews & Murray are the contractors. The floors are to be fireproof on the "Mark Fawcett" system. The constructional iron and steel work is being supplied and fixed by Messrs. Mark Fawcett & Co., of Westminster.

FIRE STATION, BIRKENHEAD.—On the 17th inst. the new Fire Station for Birkenhead was opened by the Mayor (Mr. George S. Oldham). The station is situated at the junction of the Whetstone-lane and Borough-road, near Charing Cross. The site is of a triangular shape. The buildings comprise the Fire Station proper, with superintendent's house, and quarters for twelve single men, and has the main elevation to Whetstone-lane, which has been widened opposite the buildings to 50 ft. The engine-house fronts on to Whetstone-lane, and is lined with glazed bricks and paved with small clinker bricks. It has accommodation for two steamers and a hose tender, all of which can be taken out direct by means of three large folding doors opening clear on to the road. In immediate connexion is the recreation room for the firemen, and adjoining this is the duty-room and superintendent's office. In the duty-room are placed all the fire-alarm indicators in connexion with thirty-four electric and telephone alarm-boxes, erected all over the borough, fire bell, and house alarms. In the yard at the rear there is a four-stalled stable, loose box, blacksmith shop, joiner's shop, hose store, and a boiler pit to allow of the boilers being lowered out of the steamers for repairing purposes. The superintendent's house is immediately over the recreation-room and office. The single men's and engineer's houses are over the engine-room. In the basement, in addition to the coal cellars, a large washing cellar is provided with boiler, &c., for the general use of the station. Each of the houses is fitted with alarm-bells in connexion with the duty-room, which by one movement can be set ringing simultaneously. The engine-house doors and the stable-doors are fitted with Try's patent rapid-opening fittings, and are intended to be worked from the office. The buildings have been erected from the designs and under the superintendence of the Borough Engineer (Mr. Charles Brownridge, A.M.Inst.C.E.), Mr. James Merritt being the contractor. The fire-alarms have been erected by Mr. W. Shaw, of Stockport, and the fire-bells and automatic switch by Mr. F. Pulford, of Birkenhead.

MUNICIPAL TECHNICAL SCHOOLS, BIRMINGHAM.—The new Municipal Technical schools, which have been erected in Suffolk-street, Birmingham, were opened on the 13th inst., by the Duke of Devonshire. The cost of the building and land has been nearly 89,000*l*., and the architects were Messrs. Essex, Nichol, & Goodman, Birmingham. The building is constructed of brick, with terra-cotta facings. It consists of a main block, flanked with an east and west wing. The main entrance is one of the features of the façade. Spanned by a wide, deeply-recessed elliptical arch, enclosing four pairs of swing-doors, it is rich in modelled ornament, and in the spandrels are figure-subjects representing various sciences. These figures are repeated inside, and form part of the decoration of the staircase-hall leading to the staircases and corridors, which are also lined with enriched terra-cotta. The city arms are freely used, along with ideal human, animal, and foliated forms. Inside the building no fewer than 115 apartments are available in the five floors. On the ground-floor are the Assembly-hall of the Examination-room, the Library, and Secretarial Department, with rooms for the committees, principal, and secretary. The interior framework of the building is of steel. Heavy steel columns rest on a solid rock foundation, and these columns are carried up to the top of the structure, being rivetted together by means of heavy cross beams at each floor. The spaces between the steel floor girders are filled in with granolithic flooring, which is strengthened by steel wiring. In the Assembly-hall the floor is of pitch-pine, arranged in panels; the walls, for two-thirds of their height, consist of a glazed ware dado, surmounted by arcaded terra-cotta screen on the walls, the upper part being a flat, old-gold frieze, giving relief to the lower part. The ceiling is panelled and moulded. The platform is arcaded and panelled in oak and walnut. The ornamentation of the library only differs from that of the hall in that the books of the former supply the decorative arcading of the latter. Three large lecture-rooms adjoin, each giving accommodation for 250 students. Each lecture-room has preparation-rooms and stores close at hand. There are two staircases, one at the junction of each wing with the central block. The first and second floors surround the two galleried lecture-rooms placed over the Assembly-hall, and contain the departments for physics, electrical engineering, telegraphy, and the class-rooms for women, botany, geology, &c. The Physics Department occupies the west wing towards Suffolk-street. The various rooms communicate, so that a long range for optical work can be obtained, whilst in close proximity are two dark-rooms for photography. In a similar position in the east wing are the Electrical Engineering and Telegraphy Laboratories, and adjoining them are the Experimental Dynamo and Battery Rooms, connected with the source of motive-power in the basement. In the Women's Department, the only portion fully equipped so far is the botany room. The third floor is entirely devoted to chemistry, with the exception of one-half of the east wing, which is kept for mechanical drawing. On the fourth floor are to be found a large room for building construction and another for geometry. On the lower ground floor is the Metallurgical Department, including electro-metallurgy and bronzing, and, in the east wing, the workshops for carpentry, joinery, and pattern making. On the basement are a large lecture-room for metallurgy, mechanical laboratory, workshops for iron and steel, brass and other metal trades, while the sub-basement is devoted to engine rooms for electric lighting and motive power, space for boilers, heating apparatus, &c. The building is, as far as possible, built of fire-proof materials. The rooms are warmed throughout with hot air.

THE BUILDING TRADE IN ABERDEEN.—During this year house-building has been actively carried on in all the suburban districts, as well as on vacant sites nearer the centre of the city. Beyond the dispute as to joiners' wages previously noted, no difference between employers and employed occurred. An exceptional number of workshops have been erected in 1895. During the twelve months from January to December inclusive the Town Council have sanctioned the plans of 219 dwelling-houses; fifteen blocks of dwelling-houses and shops; eight cottages; two villa-residences; forty-three factories, workshops, &c.; sixty alterations and additions (many of them on a large scale) at various premises; and forty-two miscellaneous erections, including warehouses, offices, stables, small stores, &c. Plans of six new public schools, halls, hospitals, &c., were also approved of, as well as nine plans of alterations and additions in buildings of this class. The Government are to erect a new general post-office on a central site, to meet the increased wants of the city. The prospects in the building trade generally are still remarkably good. During 1895 fourteen steam-vessels were launched, the aggregate tonnage being disappointingly small; but a considerable amount of repairing work was done. There are in hand ten steam-liners and two small steamers.

SANITARY AND ENGINEERING NEWS.

BROWNHILLS SEWERAGE SCHEME. — At the meeting of the Brownhills Urban District Council, held on the 11th inst., after the report of Mr. J. T. Eayrs, the assessor, with reference to the competitive plans for the sewerage of the Walsall Wood District had been considered in committee, the plans of Mr. H. Bertram Nichols, C.E. ("Forward"), of Birmingham, were adopted by eight votes against four for Mr. W. H. Radford, C.E. ("Gravitation"), Nottingham, who was awarded the second premium. The estimated cost of the selected scheme in regard to the engineering work is 9,387*l*. Thirteen schemes were submitted.

SEWAGE DISPOSAL AT SHEPTON MALLET.—Much difficulty has been experienced in dealing with the sewage of this town, mainly by reason of the enormous quantities of brewery refuse which were formerly present in the sewage the sewage-

farm was also badly laid out, and was until recently in a deplorable condition. Owing to the pressure brought to bear upon the Local Authority by a riparian owner, it became necessary to remedy the state of affairs, and, acting under the advice of Messrs. Taylor, Sons, & Crimp, of Westminster, the Urban District Council have constructed efficient works for the chemical treatment of the sewage, for the filter-pressing of the sludge, and have also brought the farm into a thoroughly efficient condition.

IMPROVED PATENT TIPPING VAN.—Mr. Geo. Rowe, of Lower Edmonton, sends us particulars of his tipping van for slops and dust, which can be tipped no matter in what position the horse and front wheels may stand, either in a direct line with the hind wheels, or half turned, or at right-angles. The patent tipping apparatus allows the load to be tipped gradually and held at any angle, thus preventing the slop from splashing about and avoiding that strain on the body which takes place when vans are tipped up all at once.

FOREIGN AND COLONIAL.

FRANCE.—The Société Centrale des Architectes Français continued the general elections last Sunday for the Bureau and the Administrative Council. The result is as follows:—M. Charles Garnier, President; MM. Corroyer, Achille Hermant, and Newnham (of Lille), Vice-Presidents; MM. Boileau, Secretary; Poupinel, Assistant-Secretary; L. George, Corresponding Secretary; Frantz Jourdain, Keeper of the Records; and Bartaumiaux, Treasurer; MM. Raulin, Guadet, and Lalanne, Controllers of the Press; MM. Wallon, Etienne, Roux, Daumet, Duchatelet, Delaage, Gautier, Parisian Delegates to the Council; MM. Marmottin (of Coulommiers), Perrin (of Lyons), Faget (of Bordeaux), Beignet (of Angers), Provincial Delegates. —— An underground chapel, recalling in miniature the tomb of Napoleon at the Invalides, is to be built at the Pasteur Institute, to receive the remains of the great savant. It will be under the principal entrance.——M. Menzel, artist, of Berlin, has just been elected an Associated Foreign Member of the Academie des Beaux-Arts, in place of the late Mr. H. Hunt, of New York.—— The fourth annual exhibition of American lady artists is open, in the Rue de Chevreuse, and will be closed at the end of May.——A college is to be built at St. Germain-en-Laye, the expense of which is calculated at 500,000 francs. —— The Committee on Historical Monuments has given a favourable answer to the project presented by the architect, M. Revoil, relating to the preservation of the monuments and ruins of the ancient city of Baux, near Arles. The Minister of Fine Arts has in consequence given a sum of money for the restoration of the tower of the château, and of the chapel which will form the Lapidary Museum, also something for the preservation of the Church of Baux and its beautiful turret.——On Sunday last the new buildings of the Lycée at Tours were inaugurated, also the Medical College at Rheims.——A fine chapel is to be erected at Biarritz, in the neighbourhood of Thermes-Salins.——A municipal building is shortly to be erected in the town of Annecy.——A sum of 128,000 frs. has been given for the restoration of the palace of the Ducs de Bourgues, at Dijon.——M. Albert Ballu, principal architect of historical monuments in Algeria, who has already the charge of the diocesan buildings of Algiers and Oran, has also been appointed diocesan architect of Constantine.——The Academical Society of Architecture at Lyons, has given the first prize for the open competition in architecture in 1895, to M. Paul Cret, pupil of MM. Huguet and Bernard; and the second prize to M. Maxim Roisin, pupil of M. Blondel. The subject was the decoration of the Place Bellecourt.——The town of Marseilles has just opened a competition for a building for the Faculté des Sciences.——The town of Geneva is said to be going to oppose, by every means in its power, supplying Paris with water from the lake.——The death of M. Louis Aimé Bouchain at the age of 52 is announced; he was a member of the Société Centrale. He was a pupil of M. Fourdrain and of the Ecole des Beaux-Arts.

GERMANY. —The Emperor has given 500*l.* towards the cost of the monument which is to be erected near Leipzig on the great battlefield of the same name. A competition has been held for the design of the monument.——At the Royal Academy there is a special exhibition of paintings by Achenbach, Menzel, and Schrader. Of the private galleries we must mention Schulte's rooms, with some of Professor Herkomer's work, and some paintings by Krummhaar, of Vienna. —— The painter Menzel celebrated his eightieth birthday on the 8th inst., when there was a large reception at the Royal Academy and numerous banquets, and the popular painter received many addresses and distinctions.——The gigantic bronze "Berolina" is now being erected on the Alexander Platz at Berlin. Professor Hundriessor is the sculptor.——The new West Theatre at Berlin is being rapidly completed, and is already roofed in, as the building has to be opened in time for the Industrial Exhibition next May. The frontage is about 140 ft., and its depth nearly 200 ft., and it is situated in its own extensive grounds facing the Kant Strasse. The plans, which have been prepared by Herr Sehring, show seating accommodation for about 1,800. Six hundred seats are in the "area," *i.e.*, combined first and second stalls. The stage has a width of about 65 ft.——An unfortunate accident is reported from Munich in connexion with the new "German Theatre" which is nearing its completion. The scaffolding broke down, and there were several fatalities.——The competition for designs of the new provincial museum at Hanover has been decided in favour of Professor Stier's work. There were forty-two competitors.

SAXONY.—The first series of alterations to the Royal Castle at Dresden has now been completed, and no further work can be taken in hand until more money has been voted by the Saxon Diet, the first instalment having been entirely exhausted. The first series of alterations included a very successful remodelling of the principal façade of the castle looking towards the "Zwinger," and some very satisfactory work in the German Renaissance style of the sixteenth century takes the place of the nondescript exterior which was formerly an eyesore in the picturesque surroundings. One of the large staircases has also been rebuilt, and is decorated in Louis XIV. style, together with a number of the larger reception-rooms. Messrs. Dunger and Froelich, both Court officials, were the architects, and Herr Roch, the sculptor, superintended the plastic decoration.——At Dresden the authorities are now considering a scheme for a new Natural History Museum, so as to leave more room in the historical "Zwinger" for the Royal porcelain collections. Professor Meyer, the custodian of the Zoological Museum, is taking an active part in this scheme. There is also a scheme for a new Record Office, so as to relieve the "Albertinum," which is already overcrowded, and a new picture gallery for modern works of art, as Gottfried Semper's Gallery is also overcrowded. Several votes have been passed in reference to a movement to open the galleries in the evening, and experiments are to be made with the electric lighting of several rooms.

MISCELLANEOUS.

LECTURES ON ARCHITECTURE AT DARLINGTON. —During the last twelve weeks a course of lectures has been delivered at Darlington by Mr. D. H. S. Cranage, M.A., lecturer under the "University Extension Scheme," on "Mediæval Architecture;" and excursions were made to neighbouring buildings to illustrate the styles lectured upon. The most important place visited was Durham, where Mr. Cranage lectured to about 200 ladies and gentlemen in the Cathedral, and Mr. J. P. Pritchett, of Darlington, did the same in the Castle. The churches of Wycliffe, Heighington, and Staindrop were also visited; the class being conducted each day by Mr. Pritchett, who explained the architecture with special reference to Mr. Cranage's lectures. The closing lecture was given last Wednesday in St. Cuthbert's Church, Darlington, but as the class of 200 was too large to conduct at one time, Mr. Cranage gave his lecture twice, and each time, after the lecture, the half-class was again divided into two parties of about fifty each, Mr. Cranage explaining the details of the chancel to one party, whilst Mr. Pritchett described the features of the nave and transepts to the other half; after which the parties changed places, and so all had every part thoroughly dealt with.

CHRISTMAS CARDS.—Messrs. Beeching, of the Strand, send us some pretty and rather novel Christmas cards designed specially to be sent from London to country friends, containing sketches of London buildings and scenes, leaving a margin for the greetings. This is entitled the "Metropolitan Series"; they also produce a "Homeland Series," in which a sketch of the sender's house can be introduced; and a Temple series supposed to be attractive to the Bar, who, however, for the most, we fear, do not set much value on the exterior picturesque of their realm.

VENTILATION AND WARMING, &C.—We are asked to state that the business of Messrs. Baird Thompson & Co., ventilating engineers, has been acquired and is being carried on by a new company under the title of the "Grahtryx Ventilating and Engineering Company, Limited."

ST. NICHOLAS, DEPTFORD.—We read in *Notes and Queries* that a fine piece of oak carving, ascribed to Grinling Gibbons, has been removed from over the porch of the charnel-house, in the churchyard, into the interior of the church, and is now protected by a glass case. The subject of the carving is Ezekiel's vision in the valley of Dry Bones.

THE SANITARY INSTITUTE.—At an examination for Inspectors of Nuisances, held in London on Friday and Saturday, December 6th and 7th, 1895, 128 candidates presented themselves. Questions were set to be answered in writing on the 6th, and the candidates were examined *viva voce* on the 7th. The following 83 candidates were certified, as regards their sanitary knowledge, competent to discharge the duties of Sanitary Inspectors:—H. Adams, Islington; W. J. S. Adams, Bournemouth; S. P. Andrews, Hertford; W. G. Auger, Clapham, S.W.; K. J. L. Bannerman, Hackney; W. Baxter, Stroud Green; Miss I. J. Bird, Clapham Common; A. Boyd, Belfast; J. G. Brehant, Highgate; W. G. Bugg, Battersea Rise; J. H. Bull, East Croydon; G. Clarke, Beckenham; T. A. J. Tilsed Collingwood, Coalville; W. A. Collins, London; C. B. Cook, Chelsea; A. Cornell, Romford; T. Cutting, Notting Hill; F. Dawkins, Southampton; A. M. Day, Limehouse; Miss J. L. de Pledge, London; G. T. Dewey, Camberwell; I. W. Dickinson, Bournemouth; F. R. Dickinson, Sheffield; F. T. Dunmore, Crouch End; J. B. Duro, Ilkeston; D. Edwards, Ton Pentre; T. R. Egginton, Birmingham; J. Ellson, Ripley, Derby; W. Firth, Dalston; J. R. Fleck, Lavender Hill; E. W. Fricker, Westminster; H. N. Fryer, Grays; H. Gordon, Islington; J. H. Gray, Leicester; J. T. Griffin, Chingford; L. Hanks, Berners-street; W. R. Harris, Upton Park; T. W. Hayward, Weston-super-Mare; F. A. Heryet, Greenwich; F. B. Hill, Highbury Hill; Miss E. M. Homersham, Tufnel Park; W. W. Howes, Maidstone; A. T. Hubble, Bloxwich; A. Hudson, Nuneaton; Miss A. M. Johns, Bournemouth; C. Johnston, Islington; E. F. Kemp, Clapton; J. S. Knight, Basingstoke; W. J. Lambert, Swansea; A. R. Lane, West Kensington; C. Langstone, Westminster; H. C. Leat, Totterdown; F. T. Long, London; J. Mansell, Hackney; W. Mant, Emsworth; H. Mardell, Leytonstone; E. W. F. Martin, Tunbridge Wells; J. F. B. May, Tunbridge Wells; G. R. Metzler, Chelsea; R. J. Millward, Hampstead; G. G. Morley, Peckham; J. F. Norris, Stoke Newington, C. Outhett, Nelson; E. W. Penn, Walthamstow; F. A. Pratley, Cheltenham; G. Rackham, West Hampstead; J. Seig, Paddington; A. Sims, Romford; F. W. Sinclair, Lavender Hill; A. Smith, Bristol; A. C. Stephens, Longford-street; A. W. Stiles, Forest Gate; W. J. Storer, Clapham; T. Sinson, Shepherd's Bush; W. Tedham, S. Norwood; F. B. Thorpe, Selhurst; A. R. Warren, St. John's; Miss Ada F. Webb, London; C. J. Webber, Bristol; J. W. Webster, Windsor; H. T. Whitewood, Ryde, Isle of Wight; J. E. Winter, Tottenham; W. Wynne, Harrow-on-the-Hill.—At an examination in Practical Sanitary Science, on December 6 and 7, the following ten candidates were granted certificates in Practical Sanitary Science:—A. Carter, Upper Holloway; A. W. Collins, Peckham; C. King, Norwich; F. W. King, Malden; J. Law, Farnborough; W. G. Moyse, London; W. Narramore, Liverpool; J. Parham, Crouch End; J. W. Parry, Assoc.M.Inst. C.E., Anerley; C. E. Wilkinson, Walham Green.

THE CHRISTMAS HOLIDAYS.—Next week the *Builder* will be published on Tuesday, and to ensure attention all communications for the Editor must reach the office by Monday morning.

CARDIFF MASTER BUILDERS' ASSOCIATION.—The annual dinner of the Cardiff Master Builders' Association was held on the 13th inst. at the Angel Hotel, Cardiff. Alderman D. Jones, J.P. (President), was in the chair. After dinner the usual loyal toasts were honoured, and Mr. Edwin Seward proposed "The Army, Navy, and Reserve Forces," to which Major C. Rigg responded for the Volunteers. —Mr. James Turner gave "The Architects and Engineers," and Mr. W. Harpur (Borough Engineer) and Mr. Councillor F. J. Veall replied.—Mr. W. Symonds submitted the toast of "The Cardiff County Council."—Alderman P. W. Carey (ex-Mayor) and Councillor G. David responded.—Mr. George Thomas proposed "The Cardiff Master Builders' Association," congratulating its members upon being free from labour disputes, and upon the happy relations now existing between employer and employed. The Chairman first responded. He said the past year had not been characterised by anything specially important, but they had had to mourn the loss of some who had passed away, especially of the late Hon. Secretary (Mr. W. Shepherd), who was most energetic and full of practical work. Mr. Wells, he believed, would supply all their needs in succession to Mr. Shepherd as Hon. Secretary. Speaking upon general trade questions, and touching upon the great engineering strike in particular, he advocated, as the only successful method of settling disputes between employers and employed, the appointment of an official, empowered by the Government, whose decisions, as arbitrator, upon all questions should be final and loyally accepted. He went on to say that the building trade in Cardiff had been successful during the past year, the houses erected—about 1,200—being in excess of the average for the past ten years. In regard to charges of jerry-building, he spoke of the improvements effected in recent years in the thickness of walls between houses, and also in matters of sanitation. Mr. F. S. Lock (Vice-President of the Association) also responded, observing that the builders of Cardiff endeavoured to do their work honourably, and he was prepared to put their work in comparison with that of builders in other towns.

ELECTRIC LIGHT IN THE CITY.—On the 12th inst., a meeting of the Court of Common Council was held at Guildhall, the Lord Mayor presiding. Replying to Mr. Brooke Hitching, who asked, in view of the high price charged for the electric light in the City—8d. an unit in place of 6d. in other districts—whether the Commission of Sewers had the right of purchase at short notice and on equitable terms. Mr. H. T. Gordon, Chairman of the Commission, said they were about to enter into a contract for public lighting, but it could not be completed until they had decided which was the best system of lighting the minor

streets. The Commission would have the option of determining the contract at the end of seven, fourteen, or twenty-one years, and at the end of twenty-one years, of purchasing the undertaking outright. Meanwhile the company would have a monopoly. Mr. Alderman Bell, dissenting from Mr. Gordon's view, said there was nothing to prevent any other company coming foward, and the Commission of Sewers had no power to grant any exclusive right to a particular company.

STATUETTE OF THE ARCHDEACON OF TAUNTON.—The Archdeacon of Taunton, George Anthony Denison, M.A., celebrated his ninety-first birthday on the 11th inst., and amongst the birthday gifts received by him was a statuette of himself, vested in his robes, and wearing a skull cap. It represents the archdeacon as he is at present, and was modelled by Mr. Harry Hems, of Exeter.

HOW TO KEEP OUT FROST.—Under this title Mr. R. W. Boyd, of Bond-street, publishes a useful paper of directions to householders how to guard against the principal inconveniences caused by frosty weather, especially in regard to the freezing up of pipes, cisterns, &c.

THE LONDON BUILDING ACT: TRIBUNAL OF APPEAL.—The Secretary of State for the Home Department has appointed Mr. A. A. Hudson, barrister-at-law, to be one of the members of the Tribunal of Appeal, under Section 175 of the London Building Act, 1894, in the place of the late Mr. D. Cubitt Nichols.

POET'S CORNER, WESTMINSTER.—By order of the First Commissioner of Works, the block of eight old houses in Poet's Corner and Old Palace-yard, Westminster, were sold on the 16th inst. by public auction as bricks and mortar, and the work of demolition has commenced. It was upon the site of these houses that Mr. Yates Thompson some time ago offered a sum of 38,000*l.* for the erection of a memorial chapel, and although the offer was declined at the time, as the Commission disagreed as to the exact locale (which was the principal condition attaching to the gift), it is more than possible that it may before long be repeated. Among the lots to be disposed of yesterday were a couple of six-panelled doors at No. 3, Old Palace-yard, with carved moulding, linings, and architraves, and finely-carved pediments. There were also several marble chimney-pieces, with carved wood dressings and mantels, and others with Siena marble centres.—*Daily Chronicle.*

NORMAN ARCHITECTURE.—In a lecture at the London Institution on the 16th inst., Mr. Arnold Mitchell spoke of the fortress-like churches which were erected by the Norman builders, in which light was only admitted by narrow slit-like windows, piercing walls built massively thick in order to stand alone without the aid of buttresses, the use of which had not then been discovered. There could be no doubt that the village church was very often used as the village fortress. The windows were only narrow and slit-like at the outside. Inside they were expanded in the well-known fashion in order to give the archer play for his bow. Warkworth Church is, practically, a fortress even to-day. What a contrast with, say, the nave of Winchester, where one of the windows fills up the entire end of the nave with its glorious bar tracery. It was curious to discover from the frescoes that have been brought to light in early churches that the original Gothic idea embraced colour for interior embellishment. The lecturer had some interesting facts to note about the few existing Saxon buildings we still possess. In the nave of a little church at Colchester one might see a triangular-pointed arch, built before our English masons had actually learned how to cut the wedge-shaped stones which later were found essential for turning a true arch. Such arches are found in Egyptian tombs.

SURVEYORSHIP APPOINTMENT.—At the Court of the Worshipful Company of Fishmongers, held at their Hall at London Bridge on the 12th inst., Mr. Howard Chatfeild Clarke, of 63, Bishopsgate-street Within, E.C., was elected Surveyor to the company.

THE SLATE TRADE.—Prices for the coming year have now been arranged at all the quarries, and show a moderate increase. Trade being so brisk a higher advance was anticipated by many, but the leading quarry owners prefer keeping prices at a figure which will not induce the importation of foreign slates.

BEDFORD COURT MANSIONS.—Messrs. Archibald Smith & Stevens ask us to state that the lifts in this building, illustrated in our issue of Dec. 7, were erected by them.

TRADES TRAINING SCHOOL.—The Rev. Dr. Wace (Principal of King's College) presided over the annual distribution of prizes in connexion with the Trades Training School at Great Titchfield-street on Wednesday. The ceremony took place at the Carpenters' Hall, London-wall, and was performed, in the absence of Mrs. Wace through indisposition, by Mrs. Stanley Bird. Professor Banister Fletcher, the Chairman of the Technical Committee, in giving an account of the work connected with building construction, stated that the number of those attending the classes in masonry, bricklaying, joinery, plastering, plumbing, and other branches was 185. He might mention that all the tools required by the students had been made by themselves, and as a further proof of good and sound work he might say that thirty-one students presented themselves at the Carpenters' Hall for examination in sanitary building construction, and twenty-five had been successful. Next year a wood-carving exhibition would be held in conjunction with the Joiners' Company.—Mrs. Stanley Bird then presented numerous prizes to the successful competitors, and afterwards the certificates gained at the Carpenters' Company's recent examination on sanitary building construction, and the prizes to the successful students at the company's organised science school and workshops at Stratford.—Mr. Alfred Prestion, with reference to the latter institution, said that during the last twelve years much good work had been done by the school. They also had a swimming and other baths, of which 70,000 people had availed themselves during the last year, so that nobody could say that the company was not doing something useful, not only for the mental training, but also for the bodily health of the people. The chairman afterwards addressed the gathering, impressing upon them the importance of technical education.

THE MUNICIPAL MUSEUM, PARIS.—The Museums Department has just acquired two interesting works. One is a sketch by the late Charles Muller for a ceiling in the old Hôtel de Ville, which was burned in 1874, the subject being the enfranchisement of the communes by Louis le Gros. The other is a coffer of Rennaissance date, damascened in gold and silver, and the sides decorated with figures representing the "Seven deadly Sins." It is intended ultimately to place this in the Musée Galliera.

LEGAL.

SURVEYORS' CLAIM FOR A VALUATION.

THE case of Clutton *v.* Clarke came before Mr. Justice Wills, sitting without a jury, in the Queen's Bench Division, on the 13th inst., it being an action brought by Messrs. Clutton & Sons, surveyors and estate agents, of Whitehall-place, to recover from the defendant, Mr. Thomas Clarke, 840*l.* for work done under a contract.

Mr. Channell, Q.C., Mr. Tindal Atkinson, Q.C., and Mr. Meek appeared for the plaintiffs; while Sir Edw. Clarke, Q.C., M.P., and Mr. Crispe represented the defendant.

Mr. Channell, in opening the plaintiffs' case, said that in 1892 the defendant, who was the owner of a large block of buildings at the top of Chancery-lane known as the Chancery-lane Safe Deposit, was desirous of forming a company to take over the property. He thereupon instructed the plaintiffs to make a valuation of the property, agreeing to pay them 100 guineas for the preliminary report in any event, 500 guineas for the report which was made use of for the purpose of promoting a company in the event of the company going to allotment, and only three-fourths of the capital being subscribed, and 800 guineas if the whole of the capital of the company was subscribed. In March, 1894, the plaintiffs made a valuation, in which they stated that the rents amounted to 22,000*l.* per annum, as against 15,230*l.* at Christmas, 1887, and they estimated that the buildings, excluding the Safe Deposit, would yield a gross rental of 26,000*l.*, that the safes and strong-rooms would produce about 30,000*l.* per annum, and that the value of the leasehold interest, as between vendor and purchaser, was 387,500*l.* On receiving this valuation defendant got out a draft prospectus and entered into negotiations with certain gentlemen. A difficulty then arose in consequence of the defendant having lost a book which contained some of the information upon which the plaintiffs had based their valuation, and thereupon some of the gentlemen who had been negotiating with the defendant about the company offered to purchase the whole concern for 280,000*l.*, the object being to form a private company. This offer the defendant accepted, and the property was sold to a company of which the whole capital was subscribed. The defendant contended that he was not bound to pay more than 100 guineas, but Mr. Channell submitted that the plaintiffs were entitled to recover 800 guineas, which was less than the fee ordinarily charged for work of that kind. Moreover, it was clear that the plaintiff's valuation was used by the defendant to effect a sale of his property to the private company, and that he agreed to supply a copy of the valuation to the company and to produce the original if required.

Evidence having been given by Mr. Ralph Clutton, one of the plaintiffs, and by Mr. Samuel Garrett, a solicitor, who said that the property in question was sold to a private company for 280,000*l.*, Mr. Mills, one of the directors of the company, was called, and said that the capital of the company was 100,000*l.*, divided into 1,000 shares of 100*l.* each, but only 70,000*l.* had been raised.

Sir Edward Clarke contended that as three-fourths of the capital of the company had not been raised the plaintiffs were only entitled to 100 guineas, and his Lordship held that on the construction of the contract the plaintiffs were only entitled to 100 guineas. As the defendant had paid 100 guineas into Court in satisfaction of the plaintiffs' claim, judgment was entered for the defendant with costs.

APPLICATION TO RESTRAIN A LANDLORD FROM ALTERATION OF HIS PREMISES.

THE case of Hudson *v.* Cripps came before Mr. Justice North in the Chancery Division on the 13th inst., on the motion by a Mrs. Hudson, who was the tenant of a flat on the second floor of Oxford Mansions, near Oxford Circus, a building which was erected about twenty years ago for the purpose of being let in flats, to restrain her landlord, until the trial of the action, from going on with certain alterations on the premises, which had been commenced with the view of providing accommodation for a new club, to be called the Cavendish Club. The building is a quadrangular one, with a court in the middle, having one common entrance and staircase for the use of all the tenants, the premises on each floor having access to the general staircase by means of verandahs communicating therewith. It appeared that Mrs. Hudson held her flat under an agreement executed last March, determinable by her at one month's notice after the first year, and by the landlord at one month's notice after the first three years. The agreement, moreover, contained various stipulations and conditions, the effect of which limited the use of the premises to the purposes of a residential flat. The whole of the premises had been, until recently, used as residential flats, with the exception of certain rooms on the ground-floor, looking on the street, which had been used as offices.

His Lordship, after hearing the arguments of counsel, in giving judgment said that, having regard to the fact that the agreement was in printed form and that the premises were occupied when the agreement was made, and had been for many years occupied as residential flats, and at the various provisions contained in the agreement, he thought it clear that those provisions were intended to apply to all the flats for the mutual protection of all the tenants. The case seemed to him to come within the principles laid down by the House of Lords in Spicer *v.* Martin. What the defendant had done was to proceed to convert a building intended to be used as residential flats into a fashionable club, and he thought that there was such a departure from the terms of the agreement that she was entitled to an injunction. In those circumstances the defendant must be restrained from using the premises, or permitting them to be used, as a club or otherwise than as residential flats, and from making alterations in the premises for that purpose.

Mr. Swinfen Eady, Q.C., and Mr. Bradford appeared in support of the motion, and Mr. Buckmaster opposed.

DISPUTE OVER A BUILDING CONTRACT.

THE case of Bartlett *v.* Ford's Hotel Company, Limited, came on Monday last before the Court of Appeal, composed of the Master of the Rolls and Lord Justice Kay, on the appeal of the plaintiff, Mr. Herbert Henry Bartlett, a builder, that a decision of Mr. Justice Lawrance, in chambers, refusing to grant an injunction to restrain the defendant company, their servants and agents, including Mr. Joseph Sawyer, of 63, Chancery-lane, architect, from entering upon or proceeding with an arbitration on the 16th inst. or upon any other arbitration in respect of a contract made between the plaintiffs and the defendants, dated November, 1890, be reversed and that the injunction asked for by the plaintiffs be granted, or that such other order might be made as might seem just. Mr. Bigham, Q.C., and Mr. Boyle appeared as counsel for the plaintiff, while Mr. Cyril Dodd, Q.C., and Mr. Statham represented the defendants.

After a considerable discussion, both the action and all matters in dispute under the contract were referred to an arbitrator to be appointed by the parties, if they could agree on one, and if they could not agree on one, the arbitrator to be appointed by the Court, the costs of the appeal and the setting aside of the judgment obtained to be costs in the cause.

MEETINGS.

FRIDAY, DECEMBER 20.

Architectural Association.—(1) Mr. J. Toomey on "Brickwork"; (2) Mr. R. Rust on "Woodwork." 7.30 p.m.

Crystal Palace School of Practical Engineering.—Announcement of list of certificates awarded by the examiners. 12 noon.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

21,734.—CEMENTS: *E. Weckwarth and another.*—An improved floury mixture, or dry cement, for making stucco work, having a smooth surface, consisting of albumen, potash, lime, potash-alum and borax, combined with plaster of paris, in suitable proportions.

21,745.—SURVEYING INSTRUMENTS: *D. Aramburn.*—An instrument for measuring distances, plotting, grading, &c. The instrument is mounted on wheels, and consists of two recording discs or plates, each having a separate independent shaft, turning on suitable bearings. An endless screw placed between the discs, with a nut adapted to move on the screw, and provided with opposite styles to record lines on the opposite discs, and an eccentric and cog-wheel mechanism connecting the axle of one set of wheels and said screw, whereby the nut carrying the styles is carried to and fro on its screw. A platform is mounted on the axle of the front wheels, on which is fixed a pointer, in connection with a pivoted tongue. On the direction of this tongue being changed the motion is communicated to one of the discs by means of a vertical shaft and cog-wheels, marking the corresponding angle on said disc.

474.—SAW GUARD: *G. Parkinson.*—Relates to a guard for circular-saws, consisting of wire-work or other open

CONTRACTS AND PUBLIC APPOINTMENTS.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Making-up Linden-grove	Beckenham U.D.C.	J. A. Angell	Dec 23
*Making-up Princes-road	do.	do.	do
Infirmary Works, Clayton, Yorks.	North Brierley Union	J. Drake	Dec. 24
Kerbing and Channelling, Wolverton	Bucks County Council	R. J. Thomas	do.
Class-room, &c. St. Matthew's School, West Town, Dewsbury	.....	Holtom & Fox	do.
House, Ben Rhydding, Yorks	.....	Fairbank & Wall	do.
Five Houses, Claremount-road, Halifax	.....	G. Buckley & Son	do.
Pair of Cottages, Buckland Newton, Dorset	J. C. Foot	.....	do.
Waterworks (three contracts)	Alyth (Perthshire) Burgh Comms.	*Official*	do.
Footpaths, &c. Washington, Durham	Great & Little Usworth Parish Council	do.	do.
Granite Setts and Kerbing	Ramsgate T.C.	do.	Dec. 26
Tweuty-two Houses, Hebden Bridge, Yorks	.....	W. H. Cockeroft	Dec. 27
Ironwork	Burton-upon-Trent Corp.	F. L. Ramsden	do.
*Making-up Streets and Laying Concrete Flags	Walthamstow U.D.C.	G. W. Holmes	do.
*Police Station, Rickmansworth	Herts County Council	U. A. Smith	Dec. 28
Excavating and Reservoirs, near Blackburn	Whitnell U.D.C.	Brierley & Holt	do.
Five Shops, Town Hall-street, Sowerby Bridge, Yorks	.....	T. Wilkinson	do.
School Enlargement, Christ Church, Harrogate	.....	Smith & Tweedale	Dec. 30
Mill, Warehouse, &c. Congleton, Cheshire	.....	J. W. Rodger	do.
Additions to Great Northern Hotel, Bundoran, Ireland	.....	W. J. Watson	do
Council Chamber and Offices	Chipping Ongar D.C.	C. Pertwee	do.
House and Four Cottages, Preston Junc. Station, Lancs.	Lancs. & Yorks. Ry. Co.	H. Shelmerdine	do.
Street Works, Boyne Hill-avenue, &c.	Maidenhead Corp	*Official*	do.
Paving, &c. St. Augustine's-road	Bedford U.S.A.	do.	Dec. 31
Water Pipes, Service Reservoir	Masham (Yorks) U.D.C.	do.	do.
Schools, House, &c. Great Ellingham, Norfolk	.....	H. J. Green	do.
*Making up and Paving Road	Vestry of Fulham	C. Botterill	Jan. 1
*Laying Drains, &c.	Sheffield United Gas Light Co.	Fletcher W. Stevenson	Jan. 4

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered
*Iron Standards, Fencing, &c.	Borough of Colchester	H. Goodyear	Jan.
Cookery, &c. Schools, Llandaff	Governors of Howell's Glamorgan County School	G. E. Halliday	do.
*Granite Kerb	County Borough of Croydon	W. Powell	Jan.
*Wharfage, Horses, &c.	Parish of St. Martin-in-the-Fields	C. Mason	do.
*Supply of Steam Boiler and Building Chimney Shaft	Parish of St. Pancras	*Official*	Jan. 9
*Carting-away Sweepings	St. Marylebone Vestry	do.	do.
*Watering Streets	do.	do.	do.
*Removal of House Refuse	do	do.	do.
*Supply of Guernsey Granite, &c.	Stoke Newington Ves.	S. E. Burgess	Jan. 25
Shippon and Barn, Prestwich, near Manchester	County Asylum Com.	*Official*	No date
Factory, Commercial-street, Higham Ferrers, Northants	T. Gadsby	H. Adnitt	do.
Eleven Cottages and House, near Waterloo-road, Harrogate	A. Bodman	T. W. Marshall	do.
Additions, &c. to People's Hotel, Albert-street, Harrogate	.....	T. W. Marshall	do.
Alterations, &c Belfield, Tenby	.....	F. L. Pitten	do.
Primitive Methodist Church, Audley, Staffs.	.....	J. D. Mould	do.
Villa, Daisy Hill, Bradford, Yorks.	.....	Fairbank & Wall	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Clerk of Works and Inspector	Boro' of Cambridge	2*l*.	Dec. 28
*Manager of Sewage Works	Hertford Corp.	1*l*. 15s. week and house	Dec. 30
*Assistant Surveyor	County of Stafford	175*l*. per annum	Jan. 1
*Clerk of Works	Hammersmith Vestry	4*l*. per week	Jan. 6

Those marked with an asterisk (*) are advertised in this Number. *Contracts, pp.* iv., vi., viii., *&* xviii. *Public Appointments, p.* xvi.

work, hinged as specified in a former patent, Nos. 375-95, to which reference is made.

706.—CHIMNEY COWL: *G. Locke.*—Consists of a vertical pivoted tube, having an opening in one side in which a taper tube is inserted with its axis horizontal. Another opening is made on the opposite side of the vertical tube, and provided with a short projecting tubular portion, which forms the smoke outlet. The top of the cowl is provided with a vane for keeping the smoke outlet from the wind.

1,107.—FIREGRATES: *S. Firth.*—Provides an air-chamber at the back of firegrates or domestic stoves by fixing a more or less curved grating-like back, in front of the stove-back proper; the chamber being supplied with air from the ashpit to flow up between the two backs for issue among the fuel. The supplementary back grating may be cast in one piece with the bottom grating.

7,493.—WINDOWS: *J. Hayhurst.*—Relates to windows having weights and pulleys. The inner bead is dispensed with, the sashes being hinged at or near their lower edges, and provided with suitable cords and pulleys to allow them to be pulled inward from the top, there being no sliding motion.

16,459.—WATER-CLOSET JOINTS: *C. Schmidt.*—Joints for connecting supply or drainage-pipes to water-closets. The bowl is made with a hollow boss having a slightly tapered aperture for the reception of a bushing, and a contracted opening at its inner end formed by an annular flange having notches on its face for the reception of lugs on the bushing. The bushing is of rubber, and provided with annular flanges, which overlap one another and are compressed against the inside on inserting the union member or entering pipe.

18,842.—FIREPROOF RAFTERS: *H. Hüller.*—Deals with fireproof rafters and lathing for buildings, composed of iron plates or girders encased in cement.

NEW APPLICATIONS FOR LETTERS PATENT.

DECEMBER 2.—22,993, W. Sladdin, Automatic Ventilator for Drains.—23,003, J. Whitehead, Repairing Burst or Fractured Water Pipes.—23,004, J. Prentice & R. Pepper, Slate-boring Machines.—23,018, E. Coulon & J. Defalque, Artificial Stones.—23,024 J. Griffin & W. Pinchbeck, Waste Preventer.—23,058, W. Thompson, Press for use in Making tiles, &c.—23,074, D. Hilton, Metal Lath.

DECEMBER 3.—23,080, C. Tozer, Guard Attachments and other improvements relating to Roof Gutters.—23,093, J. Kingsmill, Self-acting Window Silencer.—23,102, J. McCullock, Window-sashes.—23,104 E. Prew, Window-frames, Sashes, and Fastenings.—23,110, T. Hill, Wall Tiles.—23,121, J. Bass, Drill-brace.—23,155. A. Hail, Colour Wash or Distemper Paints.—23,160, E. Cahoone, Fire-stoves or ranges.—23,162, G. Parrock, Fastening and Releasing the Sashes of Windows.

DECEMBER 4.—23,183, W. Ferguson, Window-sash Fastener.—23,201, T. Downie, Window-sashes.—23,202, C. Jurany, Varnish.—23,203, J. Row, Opening, Closing, or Adjusting Fanlights, Ventilators, &c.—23,207, A. and T. Dale, Paints for Resisting Acids and Alkalies.—23,216, J. Breeden & Co., Ltd., and F. Breeden, Flushing Apparatus for Water-closets, &c.—23,229, A. Adams, Locks or Fastenings for Sliding Window-sashes.

DECEMBER 5.—23,253, T. Robertson, Preventing Windows from Shaking and Rattling.—23,292, H. Walkley, Chimney and Ventilating Shaft Tops.

DECEMBER 6.—23,358, E. Blake, Screws.—23,359 and 23,360, W. Morgan, Ventilation of Sewer Entrance Covers, and other Covers for Drainage, &c.—23,386, O. Jamieson, Door Locks.—23,390, W. Hougham, Fastenings for Securing Windows and Doors.—23,400, J. Boyd-Wilson, Floorings and Ceilings of Buildings, &c.—23,416, S. Page, Electric Door Fastening.

DECEMBER 7.—23,455, G. Kinsey and others, Fireplaces, Grates, &c.—23,460, T. Blandford, Safety-valve Top or Cock to Relieve the Pressure and Prevent Explosions in Kitchen Boilers.—23,476, J. Parkison, Drainage of Houses and Buildings.—23,479, S. Dix, Wastes and Connexions with Water-closet Pans, Baths, Lavatory Basins, &c.—23,482, W. Critchlow, Permanent-way Taper-head Wood-screw.—23,498, J. McDougall, Window Frames and Sashes.

PROVISIONAL SPECIFICATIONS ACCEPTED.

21,417, P. Beaumont, Sewer and Drain Air Inlet.—21,432, A. Meiklejohn, Door Stop and Check.—21,505, H. & F. Stephenson, Water-closet Basins and Appliances connected therewith.—22,053, J. Gordon, Glazing of Brick, Tile, or other Surfaces.—22,102, D. Bryce, Chimney Cans, or Cowls.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

2,546, H. Jelley & R. Dorrett, Planing or Working of Wood.—16,662, J. Parker, of the Firm of Marion & Co., Preventing the Picking of Door Locks.—19,883, G. Yost, Window Fasteners,—20,744, W. Thompson, Water-closets, &c.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

DECEMBER 2.—By *R. Dalton* (at Carlisle): A f. farm, Longburgh, Cumberland, containing 60 a. 0 r. 21 p., 2,200*l.*

DECEMBER 3.—By *Messrs. Spelman* (at Yarmouth): 5, St. George's-ter., Yarmouth, Suffolk, f., 620*l.*—By *W. H. Hanson* (at Gainsborough): Six enclosures of land, Stow, Lincoln, 31 a. 2 r. 29 p., f., 1,625*l.*; f. cottage, barn, &c., Willingham, Lincoln, 0 a. 3 r. 0 p., 76*l.*—By *T. Walker & Sons* (at York): A farmhouse, buildings, and land, Huntington, Yorks., 9 a. 1 r. 27 p., 855*l.*

DECEMBER 4.—By *Hollis & Webb* (at Beeston): 23 f. cottages, Low Fold, Churwell, Yorks., 925*l.*; "Low Field House," 13 cottages, f., 640*l.*; "Simon Bottom's Farm," 14 a. 2 r. 32 p., f., 1,400*l.*; 4 f. cottages, Town-st., Beeston, Yorks., 355*l.*; 2 plots of land, Town-st., &c., 3 a. 1 r. 36 p., f., 725*l.*; "Red Hill Farm" and 7 enclosures, 22 a. 0 r. 3 p., f., 2,525*l.*; "Beggar's Hill Farm," 26 a. 0 r. 35 p., f., 5,000*l.*; a plot of building land, Wickham-st., Holbeck, Yorks., f., 1,241*l.*

DECEMBER 5.—By *Edwin Evans* (at Clapham Junction) 26, Almeric-rd., Battersea, u.t. 230 yrs., g.r. 6*l.*, r. 34*l.*, 285*l.*; 109, 111, 113, and 125, Plough-rd., Battersea, u.t. 84 yrs., g.r. 30*l.*, r. 129*l.*, 1,210*l.*; 10, Hauberk-rd., u.t. 84½ yrs., g.r. 7*l.*, e.r. 42*l.*, 365*l.*; 2 to 10, and 152 to 162 (even), Maysoule-rd., u.t. 82 yrs., g.r. 55*l.*, r. 330*l.* 4s., 1,865*l.*; 2 to 14 (even), Patience-rd., u.t. 82 yrs., g.r. 37*l.*, r. 230*l.* 2s., 1,275*l.*; 20, 22, and 24, Anerley-st., u.t. 73½ yrs., g.r. 10*l.* 10s., r. 89*l.* 14s., 570*l.*; 90, Wadhurst-rd., u.t. 79 yrs., g.r. 2*l.* 10s., r. 15*l.* 10s., 140*l.*; 6, Pincott-rd., Merton, u.t. 77 yrs., g.r. 4*l.* 15s., r. 28*l.*, 410*l.*; 1 to 5, Hereford Cottages, u.t. 77 yrs., g.r. 16*l.*, 205*l.*; 11 to 21, odd, and 31 and 33, Hardy-rd, Wimbledon, and l.g.r. 8*l.*, u.t. 94 yrs, g.r. 40*l.*, r. 189*l.* 16s., 1,000*l.*; 37, 39, and 41, Hardy-rd., f., r. 70*l.* 4s., 665*l.*; plot of bldg. land, Griffiths-rd., f., 250*l.*; plot of bldg. land, Home Park-rd., f., 345*l.*—By *R. W. Fuller, Moon & Fuller* (at Croydon): "The Surrey Cricketers" Public-House, West-st., Croydon, f., r., 60*l.* 1470*l.*; 24 and 25, West-st., f., r. 35*l.* 10s., 400*l.*; 48, Lower Coombe-st., f., e.r. 29*l.* 1s, 270*l.*; 21, Gladstone-rd., f., r. 20*l.*, 325*l.*—By *Debenham, Storr, & Sons* (at Uxbridge): "Penn Close" and plot of land, Harefield-rd., Uxbridge, Middlesex, f., r. 83*l.*, 1,570*l.*; a plot of building land, Bawtree-rd., f. 140*l.*; a plot of building land, Pressfield-rd., f. 160*l.*

DECEMBER 6.—By *Eastman Bros.*: 9, Hampton-rd., Forest Hill, u.t. 72 yrs., g.r. 6*l.* 10s., 500*l.*—By *J. M. Klenck & Co.*: 25, Clapham Common, Clapham, f., r. 50*l.*, 740*l.*; 157 to 176, Riversdale-rd, Highbury, u.t. 75 yrs., g.r. nil, e.r. 120*l.*, 310*l.*—By *Nokes & Nokes*: 97, King's Cross-rd., King's Cross, u.t. 61 yrs., g.r. 11*l.*, r. 60*l.*, 400*l.*; 80, Broke-rd., Haggerston, u.t. 48 yrs., g.r. 4*l.*, r. 28*l.*, 265*l.*—By *T. G. Wharton*: 48, 50, and 52, St. James'-st., Walthamstow, f., r. 113*l.* 10s., 2,080*l.*; 54, St. James'-st., f., sold privately; 35 and 37, East India Dock-rd., Limehouse, u.t. 21 yrs., g.r. 8*l.* 10s., r. 76*l.*, 450*l.*—By *H. C. Newson* (at Deptford): 15 & 16, Orchard Hill, Greenwich, f., r. 36*l.*, 300*l.*; 113 to 121, (odd), Royal Hill, f., r. 12*l.* 3s., 1,580*l.*; 77, South-st., f., 80*l.*; f.g.r. 7*l.*, New Eltham, Kent, reversion in 95½ yrs., 160*l.*; l.g.r. 28*l.*, Lewisham-rd., Lewisham, u.t. 56 yrs., g.r. nil, 535*l.*; l.g.r. 26*l.*, Lewisham-rd., u.t. 58½ yrs., g.r. nil, 505*l.*; l g.r. 25*l.*, Lethbridge-rd., u.t. 58½ yrs., g.r. nil, 455*l.*; u.t. 56 yrs., 40 Drysdale-rd., g.r. nil, r. 41*l.* 12s., 360*l.*; 1, 2, & 3, King-st., u.t. 82¼ yrs., g.r. 13*l.* 10s., r. 52*l.* 13s., 200*l.*; 14 to 19, Garden-row, u.t. 52 yrs., g.r. 16*l.* 10s., r. 131*l.* 6s., 840; 63, Lewisham-rd., u.t. 52 yrs., g.r. 4*l.*, r. 45*l.*, 440*l.*; 6, 8 & 10, Kerry-rd., New Cross, u.t. 66½ yrs., g.r. 4*l.* 10s., 750*l.*

DECEMBER 9.—By *Weatherall & Green*: A f. bldg. site, Whitcomb-st., &c., Pall Mall, area nearly 11,000 ft., sold privately.—By *Beale & Capps*: 216, Lancaster-rd., Notting Hill, u.t. 68 yrs., g.r. 8*l.*, r. 42*l.*, 360*l.*—By *Towers, Elkins & Co.*: 2, Monmouth-rd., Bayswater, l., sold privately.—By *Walker & Runtz*: 3 and 4, Vernon-sq., Clerkenwell, u.t. 24¼ yrs., g r. 12*l.*, r. 76*l.*, 400*l.*; 125, Tufnell Park-rd., Holloway, u.t. 69 yrs., g.r. 9*l.*, e.r. 70*l.*, 700*l.*; 30 to 33, Elthiron-rd., Fulham, u.t. 84 yrs., g.r. 24*l.*, r. 138*l.*, 1,130*l.*: 65, Campana-rd, u.t. 84 yrs., g.r. 6*l.* 10s., r. 34*l.*, 260*l.*—By *E. W. Harris*: 9 to 17 (odd) Chameleon-rd., Tottenham, u.t. 84 yrs., g.r 21*l.*, r. 78*l.*, 460*l.*; 23, Mackenzie-rd., Beckenham, f., e.r. 32*l.*, 415*l.*—By *Curtis & Sharp* (at Stratford): 32, 34, and 36, Albert-sq., Stratford, f., r. 83*l.* 4s.. 900*l.*; 24, 26, 28, and 30, Albert-sq., u t. 56 yrs., g.r. 16*l.*, 720*l.*; a block of building land, Bendish-rd., East Ham, f., 680*l.*

DECEMBER 10.—By *Wallen & Clunn*: 26, 28, and 30, Beckton-rd., Barking-rd., and 18, Morgan-st., f., 900*l.*—By *E. W. Farnham & Co.*: 234, Lyham-rd., Brixton, f., r. 30*l.*, 525*l.*—By *E. & H. Lumley*: 4, Britton's-ct., City of London, f., r. 22*l.*, 460*l.*—By *Rogers, Chapman, & Thomas*: 9 and 11, Lilyville-rd., Fulham, u.t. 82½ yrs., g.r. 16*l.*, r. 80*l.*, 595*l.*; 6, Kempsford-gardens, Brompton, u.t. 75½ yrs., g r. 6*l.*, e.r. 55*l.*, 420*l.*; 98, Tachbrook-st., Pimlico, u.t. 32 yrs., g.r. 8*l.*, r. 55*l.*, 445*l.*; 3, Victoria-st., Paddington, u.t. 56 yrs., g.r. 6*l.* 10s., 490*l.*—By *E. Simpson*: 2 and 4, Strathnairn-st., Bermondsey, u.t. 46 yrs., g.r. 10*l.*, r. 68*l.* 16s., 620*l.*—By *C. & H. White*: 159, Grundy-st., Poplar, f., r. 33*l.* 16s., 270*l.*; 66 and 68, Bishop's-rd., Brixton, and l.g.r. 4*l.* 5s., u.t. 66 yrs., g.r. 12*l.* 15s., r. 62*l.* 8s., 455*l.*; 35 and 41, Webber-st., Blackfriars, f., r. 59*l.* 16s., 650*l.*; 17, Oakley-st., Lambeth, u.t. 14 yrs., g.r. 9*l.*, r. 36*l.*, 130*l.*; i.g.r. 8*l.*, Launcelot-pl., Knightsbridge, u.t. 22 yrs., g.r. nil, 85*l.*—By *Debenham, Tewson, & Co.*: 52 and 54, Southwark-st., Southwark, f., r. 608*l.*, 14,350*l.*; 59, Highbury Pk., Highbury, f., 1,000*l.*; 135 to 159 odd, Monier-rd., Old Ford, u.t. 81½ yrs. g.r. 52*l.*, r. 270*l.* 8s., 1,200*l.*, 47, Hillside-rd., Stamford Hill, u.t. 85 yrs., g.r. 6*l.*, e.r. 30*l.*, 255*l.*—By *Messrs. Spelman* (at Norwich); "The London Café," London-st., Norwich, Norfolk, f., land tax, 4*l.* 6s. 8d., 3,850*l.*; "The Victoria Café," St. Stephen's Gates, u.t. 33½ yrs., g.r. 18*l.* 10s., land tax, 1*l.* 5s, 930*l.*; "Alexandra House," Ber-st., f., land tax, 2*l.* 7s. 11d. 1,000*l.*—By *G. B. Hilliard & Son* (at Mason's Hall Tavern): "The Cross Keys" Inn, Moulsham-st., Chelmsford, Essex, u.t. 284 yrs., g.r. nil, r. 90*l.*, 1,950*l.*—By *F. J. Bisley & Sons*: 307 to 335, 345, 345, 347, 355 to 361 odd, Rotherhithe New-rd., Rotherhithe, u.t. 52 yrs., g.r. 110*l.*, 4,316*l.*

DECEMBER 11.—By *J. & R. Kemp & Co.*: l.g.r. 70*l.*, Chester-pl., Regent's Pk., u.t. 29 yrs., g.r. 10*l.*, 860*l.*—By *F. J. Bisley & Sons*: 42 to 58, Delaford-rd., Camberwell, u.t. 81½ yrs., g.r. 45*l.*, 1,940*l.*; 2, 6, and 8, Olmar-st., Old Kent-rd., u.t. 44 yrs., g.r. 15*l.*, 660*l.*; 49 to 61, Ossory-rd., u.t. 44 yrs., g.r. 35*l.*, 1,480*l.*; 25, 28, 30, 32, and 78, Ossory-rd., u.t. 44 yrs., g.r. 25*l.*, 1,125*l.*; 60 and 62, Union-rd., Rotherhithe, u.t. 21½ yrs., g.r. 44*l.*, r. 69*l.*, 70*l.*; By *Egerton, Breach, & Galsworthy*: 30 plots of building land, Rostrevor-rd., Fulham, f. 3,466*l.*; By *W. Wilson & Son* (at Manchester): chief rents of 10*l.* 11s. 4d., Middle Hillgate, Stockport, Cheshire, 280*l.*; chief rents of 21*l.* 13s. 1½d., Buxton-rd., &c., Hazel-grove, Cheshire, 580*l.*; chief rent of 20*l.* 7s. 8d., 35 to 49 odd, Lark Hill-rd., Bow Garrett, Stockport, Cheshire, 334*l.*; and 87 and 89, Northgate-st., f., r. 68*l.* 18s., 710*l.*; 46, 48, 63, 65, and 67, Grove-lane, Gill Bent, Cheshire, and 9 a. 0 r. 5 p., f. 1,085*l.*; a Freehold Farmhouse, Chapel Walks, 2 Cottages, and 6 a. 0 r. 24 p., 750*l.*; 90 to 100 even, Manchester Old-rd., Heaton Norris, Cheshire, r. 140*l.* 5s., 1,563*l.*; 13 to 19 (odd), Pump-st., Hulme, Lancashire, f., 405*l.*; 40 to 46 (even), Eagle-st., and 10, Caton-street, f., r. 53*l.* 6s., 405*l.*; 80 & 82, Lower Cambridge-st., and 2, Brindle-st., Chorlton-on-Medlock Lancashire, u.t. 935 yrs., chief rent 7*l.* 12s. 4d.,

355*l.*; Mill-lane, &c., Macclesfield, Cheshire, chief rents of 11*l.* 14*s.* 10*d.*

DECEMBER 12.—By *E. H. Henry*: 59, 61, & 63, North-st., Clapham, f., r., 80*l.*, 1,280*l.*—By *Stimson & Sons*: F.g.r., 91*l.* 17*s.*, Borough High-st., &c., Southwark, reversion in 74½ yrs., 2,400*l.*; f.g.r. 100*l.*, Eastfield-st., Limehouse, reversion in 28 yrs., 210*l.*; 101, Ormside-st., Old Kent-rd., f., r. 27*l.* 6*s.*, 270*l.*; 54, Grosvenor-ter., Camberwell, u.t. 27 yrs., g.r. 5*l.*, r. 35*l.*, 350*l.*; 96 and 98, Grosvenor-ter., u.t. 17 yrs., g.r. 12*l.*, r. 68*l.*, 420*l.*; 242, Beresford-st., Walworth, u.t. 55 yrs., g.r. 4*l.*, r. 39*l.*, 290*l.*—By *C. C. & T. Moore*: 11 and 13, Grosvenor-rd., Mile End, u.t. 79½ yrs., g.r. 10*l.* 10*s.*, 485*l.*; f.g.r. 30*l.*, Vicarage-rd., Dagenham, Essex, reversion in 99 yrs., 620*l.*; f.g.r. 26*l.*, Lodge-rd., Croydon, reversion in 999 yrs., 650*l.*; 22, Marquess-rd., Canonbury, u.t. 52 yrs., g.r. 10*l.*, r. 60*l.*, 515*l.*; 5, Spenlow-st., Limehouse, u.t. 13¼ yrs., g.r. 2*l.*, 100*l.*; 25 to 43 (odd) Grove-st., Commercial-rd. east, f., r. 269*l.* 2*s.*, 2,010*l.*; The Abbey-st. Steam Saw-Mills, Bethnal Green, area 4,000 ft., u.t. 32 yrs., g.r. 75*l.* e.r. 150*l.*, 185*l.*; six plots of bldg. land, Jephson-rd., Upton-pk., f., 265*l.*; 79, 90, and 92, Chesterton-rd., Plaistow, f., 530*l.*—*By Newton & Co.*: Great Marlborough-st., Regent-st., a freehold rent charge of 5*l.* 17*s.* p.a., 160*l.*; i.g.r. 14*l.*, Albert-rd., Dalston, u.t. 44½ yrs., g.r. 10*l.*, 75*l.*; l g.r. 12*l.*, Cowper's-pl., Brixton, u.t. 23 yrs., g.r. nil, 130*l.*; 15, Grafton-cres., Kentish Town, u.t. 55½ yrs., g.r, 5*l.* 5*s.*, r. 32*l.*, 265*l.*; 72, Drayton-pk, Highbury, u.t. 80½ yrs., g.r. 2*l.*, r. 42*l.*, 300*l.*; 275, Essex-rd., Islington, u.t. 50 yrs., g.r. 6*l.* 15*s.*, r. 42*l.*, 400*l.*; 9 and 10, Parkfield-st., u.t. 9 yrs., g.r. 10*l.*, r. 62*l.*, 125*l.*; 61, Grosvenor-rd., Canonbury, u.t. 54 yrs., g r. 8*l.* 8*s.*, r. 55*l.*, 450*l.*; 5, West Greenwich, Tottenham, together with goodwill, u.t. 48½ yrs., g.r. 5*l.* 10*s.*, e.r. 50*l.*, 530*l.*—By *Worsfold & Hayward* (at Dover): 11 and 11a, King-st., Dover, Kent, f., r. 120*l.*, 2,250*l.*; 92, High-st., f., r. 40*l.*, 660*l.*; 15 and 16, Spring Gardens, and Builder's-yd., workshops and cottage, f., 470*l.*; 4, Hubert-ter., f., r. 30*l.*, 400*l.*; house and shop, Kingsdown, Kent, u t. 32½ yrs., g.r. 3*l.* 17*s.*, r. 32*l.*, 380*l.*; "Mill View Cottage," Mill-rd., Whitfield, Kent, f., 130*l.*

DECEMBER 13.—By *Reynolds & Eason*: F.g.r. of 96*l.*, King William-st., City of London, reversion in 16½ yrs., 11,100*l.*; King William-st., f.g.r. of 54*l.*, reversion in 16½ yrs., 6,100*l.*; King William-st., f.g.r. of 150*l.*, reversion in 17 yrs., 16,700*l.*—By *J. & W. Johnson & Co.*: 55, Granby-st., Bethnal Green, u.t. 46½ yrs., g.r. 30*l.*, r. 60*l.*, 300*l.*; 66, Westmoreland-pl., City-road, f., r. 26*l.*, 410*l.*—By *Thurgood & Martin*: 125, 127, 129, and 131, Wickersley-rd., Wandsworth, u.t. 74 yrs., g.r. 20*l.*, r. 114*l.* 8*s.*, 670*l.*; f.g.r. of 42*l.* 18*s.*, Stanley Villas, Teddington, reversion in 72 yrs., 1,170*l.*

Contractions used in these Lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent, r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G. ton	8/0/0	0/0/0
Teak, E.I. ..load	10/0/0	16/0/0
Sequoia, U.S. ft. cu	1/10	2/0
Ash, Canada load	3/5/0	4/10/0
Birch, do.	2/15/0	4/15/0
Elm, do.	4/0/0	5/5/0
Fir, Dantsic, &c.	2/0/0	3/10/0
Oak, do.	2/15/0	4/15/0
Canada	6/10/0	8/0/0
Pine, Canada red	0/0/0	0/0/0
Do. Yellow	2/15/0	5/0/0
Lath, Dantsic, fath	4/10/0	5/10/0
St. Petersburg..	5/0/0	8/10/0
Wainscot, Riga, &c., log	2/15/0	5/0/0
Odessa, crown....	2/15/0	5/0/0
Deals, Finland 1st & 1st std 100	7/0/0	8/10/0
Do. 4th & 3rd ..	7/0/0	8/0/0
Do. Riga	7/0/0	8/0/0
St. Petersburg, 1st yellow ...	9/10/0	12/0/0
Do. 2nd yellow	7/10/0	9/0/0
Do. white	8/0/0	9/10/0
Swedish	7/0/0	25/10/0
White Sea.....	7/15/0	14/15/0
Canada, Pine 1st	21/0/0	25/0/0
Do. do. 2nd.....	16/0/0	17/0/0
Do. do. 3rd, &c.	8/0/0	10/0/0
Do. Spruce, 1st..	9/0/0	10/10/0
Do. do. 3rd and 2nd	6/15/0	7/10/0
New Brunswick	6/0/0	7/0/0
Battens, all kinds	5/0/0	20/0/0
Flooring boards, 1¼, 1 in. prep.	0/9/6	0/14/6
Do. 2nd	0/6/6	0/11/6
Other qualities—	0/4/6	0/7/6
Cedar, Cuba ..ft.	/4	/4½
Honduras, &c.	/3½	/4½
Mahogany, Cuba	/3½	/6
St. Domingo, cargo av.	/3½	1/0
Mexican do. do.	/4	/4½
Tobasco do. do.	/4½	/6
Honduras do. ..	/4½	/6
Box, Turkey ton	4/0/0	15/0/0
Rose, Rio	7/0/0	16/0/0
Bahia	6/0/0	15/0/0
Satin, St. Domingo	0/0/5	0/1/0

TIMBER *continued*.

Satin, Porto Rico	0/0/6	0/1/6
Walnut, Italian....	0/0/3	0/0/7

METALS.

Iron—Pig, in Scotland .....ton	2/6/4½	0/0/0
Bar, Welsh, in London	5/12/6	5/15/0
Do. do. at works in Wales.....	5/2/6	5/5/0
Do. Staffordshire, in London.....	6/0/0	6/10/0
COPPER—British cake and ingot	46/0/0	46/5/0
Best selected ..	46/10/0	46/15/0
Sheets, strong..	53/0/0	0/0/0
Chili bars	43/3/9	43/8/0
YELLOWM'TAL	0/0/4 9-16	0/0/4⅝
LEAD—Pig		
Spanish ....ton	11.6'3	11'7/6
English com. brands	11/12/6	11/15/0
Sheet, English, 6 lbs. per sq. ft. and upwards ..	12/10/0	12/12/6
Pipe	12/10/0	0/0/0
ZINC—English sheet .....ton	18/5/0	18/10/0
Vieille Montagne	18/15/0	0/0/0
TIN—Straits.....	61/15/0	62/5/0
Australian.....	62/10/0	63/0/0
English Ingots.	63/0/0	65/5/0
Banca	64/0/0	64 10/0
Billiton	63/10/0	64/0/0

OILS.

Linseed .....ton	19/5/0	19 15/0
Cocoanut, Cochin	25/10/0	0/0/0
Do. Ceylon	22/10/0	22/15/0
Palm, Lagos	22/10/0	0/0/0
Rapeseed, English pale	24/5/0	25/0/0
Do. brown	23/5/0	23/15/0
Cottonseed ref. .	16/17/6	17/7/6
Oleine.....	19/10/0	20/10/0
Lubricating, U.S.	6/6/0	8/9/0
Do. black	4/9/0	6/6/0
TAR—Stockholm barrel	0/19/6	0/0/0
Archangel.....	0/15/0	0/0/0

TENDERS.

[Owing to the Christmas Holidays, next week the *Builder* will be published on Tuesday morning. All communications for the Editor must reach the Office not later than *Monday morning*.]

BEESTON (Notts.).—For the erection of two pairs of semi-detached villa-residences, for Mr. Thos. Thurman. Mr. C. Nelson Holloway, architect, Newcastle Chambers, Nottingham. Quantities by the architect :—

J. Cooper	£1,705	W. Donnelly	£1,550
A. G. Bell	1,670	W. Fletcher	1,500
J. Hutchinson	1,600	J. Oscroft, Nottingham*	1,500
T. Cuthbert	1,597	* Accepted.	

BRIDLINGTON QUAY.—For the construction of retaining wall and warehouses, west end of Harbour, Bridlington Quay, for Mr. J. Tely. Mr. J. Earnshaw, architect, Carlton House, Wellington-road, Bridlington Quay :—

J. Rennard	£605 12 6	B. Robinson	£463 0 0
C. Clarke	600 0 0	T. Gray, Bridlington Quay (accepted)	460 0 0
R. Bailey	581 0 0		

BRIDLINGTON QUAY.—For rebuilding No. 14, Promenade, for Mr. R. Holden. Mr. J. Earnshaw, architect, Carlton House, Bridlington Quay :—

J. Rennard	£700 0 0	R. Bailey	£582 7 6
J. H. Hudson	679 0 0	F. Postill (accepted)	565 0 0
	[All of Bridlington Quay]		

BUNCRANA (Ireland).—For the erection of a villa residence. Mr. T. Johnston, architect, 11, East-wall, Londonderry :—

Michael Sweeney	£1,075 0	Matthew McClelland, Strand, Londonderry*	£879 0
Joseph Colhoun	1,072 0	* Accepted.	
Robert Colhoun	885 10		

BURGESS HILL (Sussex).—For the construction of private street, &c., Silverdale-road, for the Urban District Council :—

E. Steer	£1,181 9 8	W. Oram	£1,163 0 0
P. Peters	1,178 16 1	W. Downer, Burgess Hill*	1,100 0 0
W. Bryant	1,172 0 0	* Accepted.	

BURTON-ON-TRENT.—For laying twenty-four miles of pipe-sewers, for the Swadlincote Urban District Council. Mr. Arthur Marshall, Engineer, Market-place, Swadlincote :—

Godfrey & Liddelow	£20,858 14 8	Herbert Weldon l.	£19 601 10 10
I. F. Price	28,006 19 6	John Hawley & Son	19,370 15 0
Parker & Sharpe ..	24,036 14 4	Jos. Tomlinson	19,000 0 0
G. E. Storey	24,032 9 3	Geo. Osenton	18,832 5 6
A. Hellett	23,286 14 11	T. Lowe & Sons ..	18,714 8 0
C. A Walker.....	21,395 2 6	A. Braithwaite & Co.	18 623 7 4
Frank Pattinson ..	21,265 7 7	J. G. Biggs	18,524 0 0
John Jackson	21,019 1 4	H. B. James	18 497 16 3
John Lane & Son	20,872 18 11	E. Tempest	18,341 6 11
Bentley, Son, & Partington	20,745 3 9	Geo. Bell	18,139 16 11
M. S. Ketteringham	20,514 6 6	Jones & Fitzmaurice	17 987 0 4
Fotherby & Son .	20,217 8 3	A. Faulks	17,610 0 8
Johnson Bros.	20,146 14 9	H. Holloway, Bilston-road, Wolverhampton*.....	15 694 5 5
J. & T. Binns.....	19 989 12 5	R. C. Brebner	15,462 12 4
James Dickson	19,988 4 0		
Currall & Lewis....	19,751 18 3		

* Accepted.

CAMBRIDGE.—Accepted for the erection of a villa-residence in Cavendish-avenue, Cambridge, for Mrs. W. Varco Williams. Mr. Sidney French, architect, Llandaff Chambers, Regent-street, Cambridge :—

Thoday & Co., Ltd. £1,230

CHELSHAM (near Upper Warlingham, Surrey) — Four-stall stable and coachhouse to the "Hare and Hounds" Inn, for Messrs. Page & Overton, Ltd. Mr. A. Broad, architect, 3, High-street, Croydon :—

D. W. Barker	£298	Marr & Carpenter .	£248
J. & J. Ward	290	J. Quittenton	243
E. P. Bulled & Co....	257	E. J. Saunders	239
W. Smith & Son	250		

CROMER.—For the erection of school buildings, for the School Board. Messrs. Bottle & Olley, architects, 5, Queen-street, Great Yarmouth. Quantities by architects :—

W. J. Botterill	£7,348 0	J. Youngs & Son	£5,987 0
W. Chapman	6,580 0	G. Riches	5,970 0
Kerridge & Shaw	6,527 0	F. Grimble	5,900 0
Cornish & Gaymer	6,385 0	J. Ward	5,892 0
G. E. Hawes	6,190 0	T. H. Blyth	5,752 0
J. Batchelor & Son ...	6,097 10	J. W. Neale	5,700 0
J. S. Smith	6,000 0	J. White, Cromer*	5,430 0

* Accepted.

DAWLISH.—For the erection of a country house and stabling at Holcombe, near Dawlish, for Miss Davidson. Messrs. N. G. Bridgman & W. H Bridgman, of Torquay, Paignton, and Teignmouth, architects. Quantities by Mr. Vincent Cattermole Brown, of Paignton :—

G. Lee	£2,465 7	Vanstone & Mumford, Torquay*	£2,312 0
Furler Bros.	2,410 14	* Accepted.	
C. Francis	2,382 0		

DUDLEY (Worcestershire).—For levelling, forming, &c., the extension of St. James's-road to the Parade, Eve Hill, for the Corporation. Mr. J. Gammage, Borough Surveyor, Town Hall, Dudley :—

Currall, Lewis, & Martin	£1,679 6 10	G. Law	£1,156 0 0
Jno. Guest & Sons..	1,548 0 0	W. Willetts	1,137 0 0
Jones & Fitzmaurice	1,360 0 0	W. Berry	1,100 16 3
J. Mackay.....	1,340 2 9	Jno. Jevons	1,100 2 0
J. Biggs.....	1,227 0 0	H. Hughes & Son, Lower Gornal, Dudley*...	1,060 0 0
G. Trentham	1,221 0 0	* Accepted.	
H. Holloway	1,185 10 0		

[Borough Surveyor's estimate, £1,165 18s. 9d.]

GOLCAR (Yorks.)—Accepted for additions and alterations to buildings, Town End, for the Executors of the late James Gledhill. Mr. Arthur Shaw, architect, Knowl, Golcar. Quantities by architect :—

Carpentry and Joinery.—James Garside, Golcar ....
Masonry.—George Milnes, Teymoor, Golcar .....
Slating and Plumbing.—T. Allison, Ltd., Milnsbridge ..... } £400
Plastering and Painting.—Dan Shaw, Golcar Hill, Golcar .....

HASTINGS (Sussex).—For the construction of Hurrell-road, on the Broomgrove Estate, for Messrs. P. H. & A. Ellis. Mr. Wm. Cooper, surveyor, 21, Havelock-road, Hastings. Quantities by the surveyor :—

H. E. Cruttenden	£980 0 0	A. King	£875 0 0
P. Jenkins	945 0 0	Jonathan Piper, Hastings (accepted)	845 6 5
W. Piper	917 5 5		

HIGH WYCOMBE (Bucks.).—For the erection of Board School buildings, and masters' residence, Bourne End, for the Wooburn School Board. Mr. T. Thurlow, architect, 2, Easton-street, High Wycombe. Quantities by the architect :—

	Estimate 1. £ s.	Estimate 2. £ s. d.	£ s. d.
S. Grist	2,168 18	419 10 0	2,588 8 0
B. Bagley & Son.....	2,057 10	349 4 6	2 406 14 6
Walden & Cox.....	2,050 8	351 17 0	2,402 5 0
W. J. Chinchen	1,950 0	448 0 0	2 398 0 0
Nash & Sons.....	2,026 0	324 0 0	2,350 0 0
H. Harris	2,037 0	298 15 0	2,335 15 0
G. Smith.....	1,999 0	299 0 0	2,298 0 0
J. Bottrill & Son	1,948 0	335 0 0	2,283 0 0
W. H. Siarey	1,979 0	250 0 0	2,229 0 0
G. H. Gibson	1,820 0	375 0 0	2,195 0 0
H. Flint	1,837 0	273 0 0	2,110 0 0
J. T. Harris	1,629 0	287 0 0	1,916 0 0
Loosley, Son, & Pearce, High Wycombe*....	1,647 0	246 0 0	1,893 0 0

* Accepted.

HOVE (Sussex).—Accepted for roadmaking and other works, Coleridge-street, for the Urban District Council :—

J. Parsons & Sons, 118, Church-road, Hove £295

JARROW.—For excavating, paving, &c., Pine-street, for the Corporation. Mr. J. Petree, Borough Surveyor, Jarrow :—

J. Adams	£156 17 0	T. Callaghan, Jarrow*	£130 11 6
G. Maughan.....	146 9 10	* Accepted.	

[Surveyor's estimate, £163 3s. 3d.]

LEEDS.—For the erection of a club-house, for the Leeds South Ward Liberal Club House Co., Ltd. Mr. Windsor Thorp, architect, 22a, Commercial-street, Leeds. Quantities by the architect :—

Bricklaying, Masonry, and Excavating.—Paul Rhodes, Skinner-lane, Leeds	£1,244 0
Carpentry and Joinery.—J. Gibson & Co., Ltd., Black Bull-street, Hunslet	756 15
Slating.—Wm. Leach, Canal Basin, Leeds	95 0
Plumbing and Glazing.—G. Thompson, Park-lane, Leeds	277 10
Plastering.—Thos. Moore, Skinner-lane, Leeds ..	201 5
Painting.—Tollerton & Co., Merrion-street, Leeds	42 0
	£2,564 10

LINTHWAITE (Yorks.).—For pulling down and rebuilding shop premises, &c., for the Morley and Yates-lane improvements, for the Urban District Council. Messrs. Abbey & Hanson, C.E., 20, Ramsden-street, Huddersfield :—

J. G. Kaye	£635	Edwin Cheetham, Milnsbridge *	£453
A. Pearson	580	Ben. Whiteley.....	440
John Haigh & Sons.....	578	* Accepted.	
A. & T. Haigh	515		

LONDON.—For alterations and additions to the "Ship and Billet" public-house, Greenwich, for Mr. Stringer. Mr. James Warm, architect, 1, Montpellier-road, Peckham :—

W. Smith	£2,469	Tyreman	£2,200
Whitehead & Co.	2,450	Simpson & Cove	2,200
H. L. Holloway.....	2,300		

LONDON.—For alterations and additions to "Bell" House, Dulwich, for Mr. H. Edgar Tidy. Messrs. Bradbear & Co., architects and surveyors, Canonbury, N. :—

J. Stead.....	£820	Simpson & Cove*.....	£667
Mitchell.....	749	* Accepted.	

LONDON.—For alteration to the "Royal Standard" public-house, for Mr. J Corbett :—

Simpson & Cave £192

No competition.]

LONDON.—For building cigar and tobacco shop at Champion Hill Railway Station :—

Simpson & Cove	£115	Ward & Co.	£108

LONDON. — For alterations, "Admiral Blakeney's Head, Cable-street, E., for Messrs. Truman, Hanbury, Buxton, & Co., Ltd. Mr. Bruce J. Capell, architect. No quantities :—

Harper	£1,090	Sheffield	£1,023
Pringle	1,045	A. Hood (accepted).....	975

LONDON.—For the supply of an elevator and conveyors in the proposed new liming-station at the Barking outfall, for the London County Council :—

The Conveyor and Elevator Co.	£1,157	H. J. Coles	£895
		The New Conveyor Co., Ltd.*	875
		* Accepted.	

LONDON.—For new sorting office, Sydenham :—

A. G. Gee	£2,578 14	J. Potter	£2,222 0
Holliday, Pearson, & Co.	2,329 0	J. Palin & Sons.....	2,107 0
West Bros.....	2,223 0	Staines & Son	2,184 0
Balaam Bros.	2,287 0	Peacock Bros.	2,183 0
W. H. Lorden & Son	2,279 0	E. P. Bulled & Co.....	2,177 0
T. White & Son	2,243 0	H. Leney*	2,159 0
		* Accepted.	

LONDON.—For three proposed residences, High-street, Highgate. Mr. Ernest H. Abbott, architect, 6, Warwick-court, High Holborn, W.C. Quantities by Mr. Alfred Johnson, 50, Imperial Buildings, Ludgate-circus, E.C. :—

Hall, Beddall, & Co.....	£4,585	J. H. Johnson	£4,344
Southcott & Co.	4,459	Macfarlane Bros.	4,280
T. W. Smith & Co.	4,390	Holliday & Greenwood ..	4,222
John Anley	4,365		

LONDON.—Accepted for the supply and erection of machinery required for the central laundry on the Boundary-street area, for the London County Council :—

Murdoch & Cameron £2,260

LONDON.—For the construction of brick-faced concrete river and dock retaining-walls, and other works, Bull Head Dock, for the Rotherhithe Vestry. Mr. Norman Scorgie, C.E., Surveyor to the Vestry, Lower-road, Rotherhithe :—

Thomas Smart.....	£5,457 4 1	A. C. Simmons	£4,364 0 0
Kirk & Randall	5,142 0 0	James Dickson	4,198 0 0
Colwell & Hazle....	5,122 16 8	John Band.....	4,133 0 0
Samuel Chafen	5,011 10 1	B. Cook & Co.....	4,078 0 0
Godfrey & Liddlow	4,954 5 9	Jno. Shelbourne & Co.	3,918 18 10
James Watson.....	4,907 13 3	Thos. Adams, Wood Green, Middlesex*	3,723 15 11
Pedrette & Co.	4,619 8 9	* Accepted.	
G. Munday & Sons	4,413 0 0		

LONDON.—For the execution of road works, Mount Pleasant-road and Spring Vale, for the Dartford Urban District Council. Mr. W. Harston, C.E., High-street, Dartford :—

Road Works.

	Mount Pleasant-road.	Spring Vale.
S. Hudson.....	£1,529 12 9	£965 12 6
G. Rackham.....	1,131 0 0	610 14 0
J. Mowlem & Co.	1,040 0 0	742 0 0
T. Adams	1,028 0 0	656 10 9
A. T. Catley	950 0 0	616 0 0
Kent Road Co., Gravesend (accepted)	908 18 4	591 13 4

Footway Works, per super. yard.

S. Hudson.....	0 6 6	0 6 6
W. Garstin & Sons	0 4 6	0 4 6
Jones' Annealed Concrete Co.	0 3 10	0 3 10
Imperial Stone Co.	0 4 0	0 4 3
Kent Road Co.	0 3 10	0 3 10
Patent Indurated Stone Co. ...	0 3 6	0 3 6
J. Mowlem & Co.	0 3 3	0 3 3

LONDON.—The London School Board are now erecting a school on the site in Fircroft-road, Tooting, to provide accommodation for 812 children, and the Works Committee have obtained the following tenders for providing and fixing a complete system of low-pressure hot-water apparatus and Trentham boilers for warming the whole of the building :—

J. Gibbs & Son	£919	J. F. Clarke & Sons.....	£650
Richardson & Co.	857	J. Wontner-Smith, Gray, & Co.	644
Strode & Co.....	757	W. G. Cannon & Sons, London-road, S.E.*	572
Maguire & Son.....	754		
Duffield & Co.	686		

* The Committee recommend the acceptance of the lowest tender.

LONDON.—For the supply and fixing of ten new boilers at the Crossness outfall, for the London County Council :—

J. & W. Barlow	£1,799 17 6	Spurr, Inman, & Co., Ltd.	£6,279 0 0
T. Thompson	7,550 0 0	W. R. Renshaw & Co.	6,230 0 0
Riley Bros.	7,443 0 0	Leeds and Bradford Boiler Co., Ltd.	5,986 0 0
Oldham Boiler Works Co., Ltd.	7,150 0 0	Yates & Thom	5,717 0 0
W. Wilson & Co.	7,104 0 0	J. Fraser & Son	5,716 0 0
John Whitehouse	6,850 0 0	H. & T. Danks, Ltd.	5,700 0 0
Daniel Adamson & Co.	6,830 0 0	Tetlow Bros.*	5 395 0 0
V. Coates & Co., Ltd.	6,500 0 0	E. Danks	5,385 0 0
R. Taylor & Sons	6,447 0 0		

* Accepted. The lowest tenderer did not fill in the schedule of prices for variations in the work, nor the schecule as to rates of wages and hours of labour.

LONDON.—For erecting a manual training centre in connexion with the Lyham-road School, Brixton, and for other work, for the School Board for London. Mr. T. J. Bailey, Architect :—

W. Downs	£1,496 0 0	J. & C. Bowyer	£1,336 0 0
Holliday & Greenwood	1,466 0 0	J. Garrett & Son	£1,328 0 0
C. Whitehead & Co.	1,432 0 0	Peacock Bros.	1,280 11 0
W. Akers & Co.	1,429 0 0	E. Triggs, The Chase, Clapham*	1,272 12 6

* Recommended for acceptance by the Works Committee.

LONDON.—For carrying out various improvements to the Infants' department of the Vauxhall-street School, Lambeth, for the School Board for London. Mr. T. J. Bailey, Architect :—

W. & H. Castle	£193 0	Rice & Son..	£127 0
W. Downs	189 0	J. C. Chalkley	125 0
Holliday & Greenwood..	159 0	B. E. Nightingale	120 10
W. V. Goad	140 0	Maxwell Bros., Ltd., Brixton-road*	109 0
J. Marsland	138 0		

* Recommended for acceptance by the Works Committee.

LONDON.—For providing additional heating surface to improve the efficiency of the hot-water apparatus at the Ivydale-road School, Nunhead, for the School Board for London :—

J. F. Clarke & Sons	£175 0	Wontner-Smith, Gray, & Co., Finsbury-pavement*	£127 0
J. Fraser & Son	169 0	W. G. Cannon & Sons	98 0
Russell & Co.	159 10		
J. C. & J. S. Ellis, Ltd..	131 17		

* Recommended for acceptance by the Works Committee.

LONDON.—For carrying out various sanitary structural alterations and improvements to the Bowling Green-lane School, Clerkenwell, for the School Board for London. Mr. T. J. Bailey, Architect :—

C. Cox	£1,986	R. A. Yerbury & Sons	£1,800
C. Dearing & Son	1,878	G. Munday & Sons, Catherine House, Trinity-square*	1,630
Staines & Son	1,877		
L. H. & R. Roberts	1,827		

* Recommended for acceptance by the Works Committee.

LONDON.—The London School Board, on the 5th inst., agreed to accept the tender of Mr. D. Charteris, Westminster, amounting to £2,202, for erecting manual training and laundry centre in connexion with the Salter's-hill School, West Norwood, for re-fixing the girls' and infants' covered playground, providing additional water-closets for the laundry centre, and also for enclosing, draining, and tar-paving the additional land acquired by the Board. The Committee have since received a letter from Mr. Charteris, regretting that a clerical error has been made in his tender for this work, and asking, under the circumstances, to be relieved from the contract. The Committee accordingly recommend the acceptance of the second lowest tender, that of Mr. E. Triggs, amounting to £2,463.

LONDON.—For structural alterations in connexion with the Infants' department of the York-road School, King's Cross, for the School Board for London. Mr. T. J. Bailey, Architect :—

C. Dearing & Son	£239 0	T. Cruwys	£210 0
McCormick & Sons	225 0	Stevens Bros.	213 10
W. T. Ballard	222 5	F. Britton, Highbury*	202 0

* Recommended for acceptance by the Works Committee.

LONDON.—For providing a new corridor and additional cloak accommodation, &c., in the Boys' department of the Ricardo-street School, Poplar, for the School Board for London. Mr. T. J. Bailey, Architect :—

T. H. Jackson	£197	D. Gibb & Co.	£145
J. Kybett	192	I. F. Holliday	145
G. Barker	160	T. White & Son, Bow*	128
J. T. Robey	154		

* Recommended for acceptance by the Works Committee.

LONDON.—For providing additional heating surface to improve the efficiency of the existing low-pressure hot-water apparatus at the Latchmere School, Battersea Park-road, for the School Board for London :—

I. & F. May	£161 0	Purcell & Nobbs	£143 0
G. Davis	149 0	I. F. Clarke & Sons	140 0
J. C. & J. S. Ellis, Ltd..	132 10	I. Fraser & Son	116 0
J. Wontner-Smith, Gray, & Co.	131 10	Duffield & Co., Slough*	112 0

* Recommended for acceptance by the Works Committee.

LONDON.—For providing a new boiler, and for additional heating surface at class-rooms of the St. Dunstan's-road School, Hammersmith, for the School Board for London :—

J. Wontner-Smith, Gray, & Co.	£314	W. G. Cannon & Sons	£280
J. & F. May	304	J. Fraser & Son	245
G. Davis	296	J. F. Clarke & Sons, Moorgate-street*	220

* Recommended for acceptance by the Works Committee.

LONDON.—For providing and fixing four sliding glazed partitions in the Boys' and Girls' departments of the Wolverley-street School, Bethnal Green, for the School Board for London :—

G. Munday & Sons	£376	W. Martin	£290
D. Gibb & Co.	369	T. White & Son, Bow*	266
Staines & Son	297		

* Recommended by the Works Committee for acceptance.

LONDON.—For extending the present system of low-pressure hot-water apparatus in the new school to the enlargement of the Fair-street School, Horselydown, and also for providing and fixing a Trentham boiler, for the School Board for London :—

Magnire & Son	£538 10	J. & F. May	£461 0
J. Wontner-Smith, Gray, & Co.	490 0	J. F. Clarke & Sons, Moorgate-st., E.C.*	402 0
W. G. Cannon & Sons	469 0		

* Recommended for acceptance by the Works Committee.

LONDON.—For enclosing, draining, and tar-paving the additional land which has been acquired in connexion with the "Forster" School, Lower Holloway, and for erecting a new boundary-wall and building buttresses to the adjoining houses, for the School Board for London :—

Marchant & Hirst*	£657 0	F. Britton	£515 15
Dove Bros.	554 0	G. Kirby	509 0
H. Knight & Son	552 0	Stevens Bros., Yonge Park*	505 10
W. T. Ballard	526 18		
J. Grover & Son	520 0		

* Recommended for acceptance by the Works Committee.

LONDON.—For providing and fixing a complete system of low-pressure hot-water apparatus for warming the junior mixed department in connexion with the Gipsy-road School, West Norwood, for the School Board for London. Mr. T. J. Bailey, Architect :—

I. & F. May	£335	J. Wontner-Smith, Gray, & Co.	£289
J. C. & J. S. Ellis	299	Vaughan & Brown, Ltd., Kirby-street, E.C.*	280
Purcell & Nobbs	296		
W. G. Cannon & Sons	293		

* Recommended for acceppance by the Works Committee.

LONDON.—For erecting a combined cookery and laundry centre in connexion with the Haseltine-road School, Lower Sydenham, and for other work, for the School Board for London. Mr. T. J. Bailey, Architect :—

W. Downs	£1,899 0	Jas. Smith & Sons	£1,609 0
E. Proctor	1,762 6	E. Triggs	1,598 0
Garrett & Son	1,727 0	J. & C. Bowyer	1,563 0
W. King & Son	1,709 0	W. Akers & Co., South Norwood*	1,525 0
J. Otway	1,691 0	Mid-Kent Building and Contracting Wks., Ltd.	1,510 0
F. G. Minter	1,675 0		
A. Black & Son	1,663 0		

* Recommended for acceptance by the Works Committee.

LONDON.—For providing additional accommodation in connexion with the Hackney Divisional Offices, on the site in Homerton-terrace, for the School Board for London. Mr. T. J. Bailey, Architect :—

H. Knight & Son	£1,839	Vernall, Danes, & Co.	£1,502
W. Gregar & Son	1,767	T. White & Son	1,498
C. Dearing & Son	1,705	D. Charteris	1,447
J. Grover & Son	1,686	W. Shurmur, Upper Clapton*	1,395
C. Cox	1,665		
McCormick & Sons	1,591		

* Recommended for acceptance by the Works Committee.

NEWHAVEN (Sussex.)—For alterations to No. 23, High-street, for Messrs. Kearley & Tonge. Mr. W. Cooper, architect and surveyor, 21, Havelock-road, Hastings :—

Lockyer	£577 10	Padgham & Hutchinson	£488 15
Card & Co.	569 0	Woolger, Newhaven*	430 0

* Accepted.

NEWMILNS (Ayrshire, Scotland).—For the erection of Town Hall. Mr. Arthur Harrison, architect, Queen Chambers, Colmore-row, Birmingham. Quantities by Mr. Anthony Rowse, 3, Newhall-street, Birmingham :—

Boyd & Forrest	£3,009	M. Muir & Co., Kilmarnock*	£2,699
Robert Anderson	2,729		

* Accepted.

PATRICROFT (Lancs.).—For the erection of stabling-house, &c., for the Eccles Corporation. Mr. A. C. Turley, C.E., Borough Engineer, Town Hall, Eccles :—

James Byrom	£6,372 5 1	Chapman & Hollingworth	£5,775 0 0
Thos. Moore & Sons	6,186 1 3	Ed. Henthorne	5,750 14 0
Frank Colson	6,179 14 9	N. Brooks & Son, Patricroft*	5,720 0 0
Samuel Warburton..	6,021 12 11		
James Roper	5,820 0 0		

[Borough Engineer's estimate, £5,800.]

* Accepted.

ROEHAMPTON.—For erecting Holy Trinity Church, Roehampton, S.W. Mr. Geo. H. Fellowes Prynne, architect, 6, Queen Anne's-gate, Westminster. Quantities by Mr. R. Henry Hale, F.S.I., surveyor, 33, Old Queen-street, Westminster, S.W. :—

	Chancel-screen and Baptistery included.	
B. Nightingale	£14,175 0 0	£14,959 0 0
D. Charteris	12,831 0 0	13,630 0 0
Kirk & Randall	12,338 0 0	13,198 0 0
W. Downes	12,325 0 0	13,178 0 0
Lawrence & Sons	12,266 0 0	13,088 0 0
F. Wright	12,147 2 11	12,993 19 11
Yerbury & Sons	12,065 0 0	12,803 0 0
J. & C. Bowyer	11,803 0 0	12,674 0 0
Stimpson & Co.	11,624 0 0	12,376 0 0
Dove Bros.	11,546 0 0	12,255 0 0
Adamson & Sons	11,261 0 0	12,027 0 0
W. J. Mitchell	11,154 0 0	11,905 0 0
Holloway Bros.	11,223 0 0	11,889 0 0
Holliday & Greenwood	10,843 0 0	11,577 0 0
Goddard & Sons	10,779 0 0	11,487 0 0
A. Porter*	10,342 15 11	11,010 17 8

* Conditionally accepted.

SEAFORD (Sussex).—For the erection of baker's premises in Claremont-road, for Mr. R. Lambe. Mr. Wm. Cooper, architect and surveyor, 21, Havelock-road, Hastings :—

H. E. Cruttenden	£1,184	C. Marling	£894
Padgham & Hutchinson	992	F. D. Foord, Hastings*	845
F. H. Berry	953		

* Accepted.

SUTTON-IN-ASHFIELD (Nottingham).—For the construction of settling-tanks, &c., in connexion with sewage scheme, for the Urban District Council. Mr. McW. Bishop, Town Surveyor, Council Offices, Outram-street, Sutton-in-Ashfield. Quantities by Surveyor :—

Attewell & Green	£2,859 0 0	J. H. Vickers	£2,217 0 0
F. J. Price	2,800 0 0	A. Jenkins	2,070 0 0
T. Smart	2,734 17 7	John Lane & Son, Skegby*	1,997 10 0
C. Baines	2,395 0 0		
W. E. Shaw	2,235 0 0		

* Accepted.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied DIRECT from the Office to residents in any part of the United Kingdom, at the rate of 19s. per annum PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, &c., 26s. per annum. Remittances (payable to DOUGLAS FOURDRINIER) should be addressed to the publisher of "THE BUILDER," No. 46, Catherine-street W.C.

W. H. Lascelles & Co.,

121, BUNHILL ROW, LONDON, E.C.

Telephone No. 270.

HIGH-CLASS JOINERY,

LASCELLES' CONCRETE

Architects' Designs are carried out with the greatest care.

CONSERVATORIES,

GREENHOUSES,

WOODEN BUILDINGS,

Bank, Office, & Shop Fittings.

CHURCH BENCHES & PULPITS.

ESTIMATES GIVEN ON APPLICATION

TO CORRESPONDENTS.

J. S.—C. R.—M. & F.—J. L. (amounts should have been stated).—H. J. C. (below our limit).

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office, 19s. per annum (or 4s. 9d. per quarter), can ensure receiving "The Builder" by *Friday Morning's Post.*

PUBLISHER'S NOTICES.

Registered Telegraphic Address, 'THE BUILDER,' LONDON.

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade advertisements, also for Special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c., may be obtained on application to the Publisher.

SITUATIONS WANTED.

FOUR Lines (about thirty words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all small sums should be remitted by Cash in Registered Letter or by Postal Orders, payable to DOUGLAS FOURDRINIER, and addressed to the Publisher of "THE BUILDER," No. 46, Catherine-street, W.C.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c., left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder," may have *Replies addressed to the Office,* 46, Catherine-street, Covent Garden, W.C., *free of charge.* Letters will be forwarded if addressed envelopes are sent together with sufficient stamps to cover the postage.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES, { NINEPENCE EACH. By Post (carefully packed), 1s.

THE BATH STONE FIRMS, Ltd.

BATH,

FOR ALL THE PROVED KINDS OF BATH STONE.

FLUATE, for Hardening, Waterproofing, and Preserving Building Materials.

DOULTING STONE.

CHARLES TRASK & SONS,

(THE DOULTING STONE COMPANY),

DOULTING, SHEPTON-MALLET.

London Agent:

E. A. WILLIAMS, 16, Craven-st., Strand, W.C.

HAM HILL STONE.

The attention of Architects is specially invited to the durability and beautiful COLOUR of this material. Quarries well opened. Quick despatch guaranteed. Stonework delivered and fixed complete. Samples and estimates free. Address, The Ham Hill Stone Co., Norton, Stoke-under-Ham, Somerset. London Agent: Mr. E. A. Williams, 16, Craven-st., Strand, W.C. [ADVT.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co. [ADVT.

SPRAGUE & CO.,

LITHOGRAPHERS,

Employ a large and efficient Staff especially for Bills of Quantities, &c.

4 & 5, East Harding-st., Fetter-lane, E.C. [ADVT.

QUANTITIES, &c., LITHOGRAPHED accurately and with despatch.

METCHIM & SON, 20, Parliament-st. S.W.

"QUANTITY SURVEYORS' TABLES,"

For 1896, price 6d. post 7d. In leather 1/- Post 1/1 [ADVT.

PILKINGTON & CO

(ESTABLISHED 1838),

MONUMENT CHAMBERS,

KING WILLIAM STREET, LONDON, E.C.

Registered Trade Mark,

Polonceau Asphalte

PATENT ASPHALTE and FELT ROOFING.

ACID-RESISTING ASPHALTE.

WHITE SILICA PAVING

SEYSSEL ASPHALTE.

PROPOSED NEW MANSIONS, STOREY'S GATE: FRONT TOWARDS THE

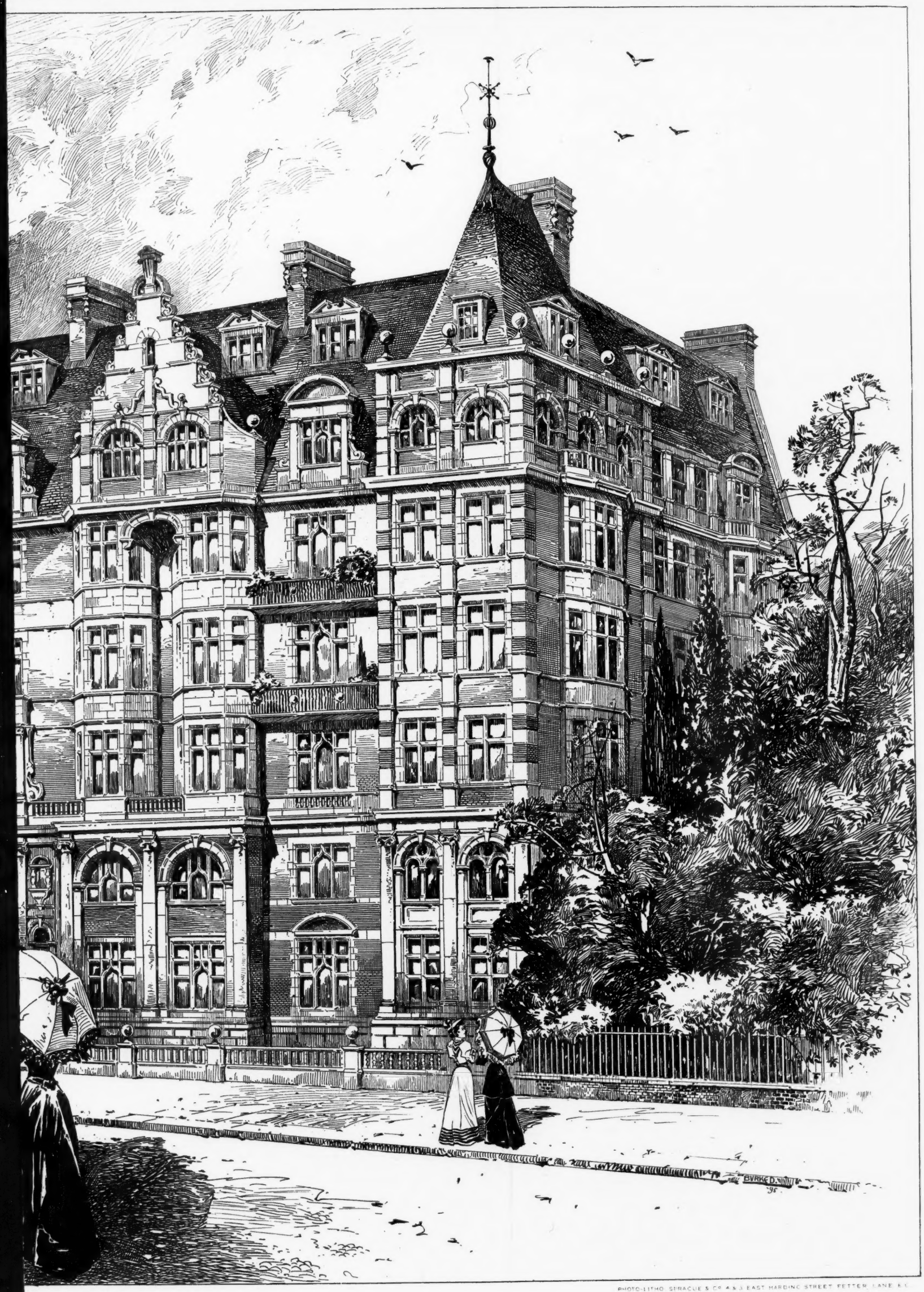
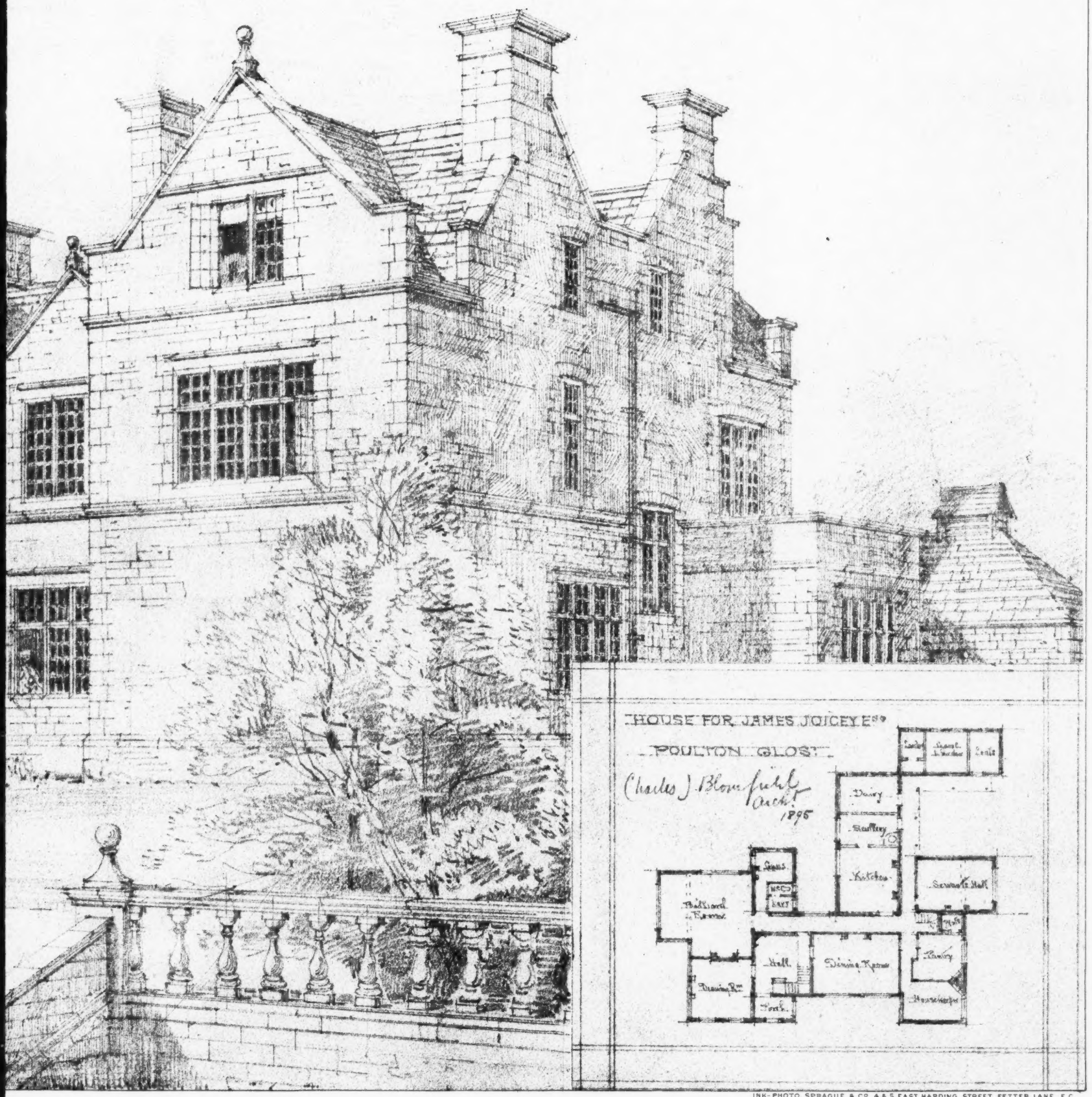


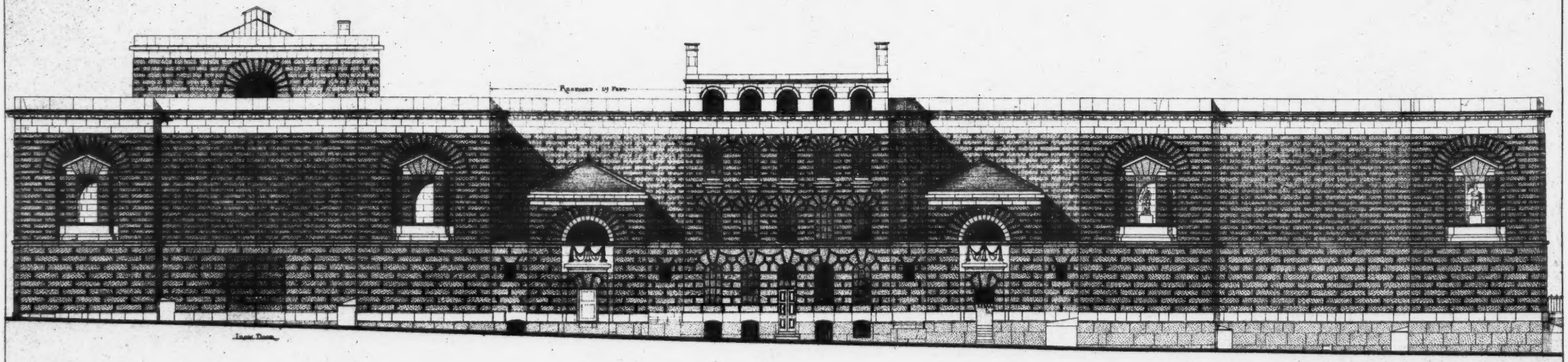
PHOTO-LITHO. SPRAGUE & Co. 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

S GATE: FRONT TOWARDS THE PARK.—Mr. Basil A. Slade, Architect.



HOUSE FOR JAMES JOICEY Esq
POULTON GLOST
(Charles) Blomfield Archt
1895

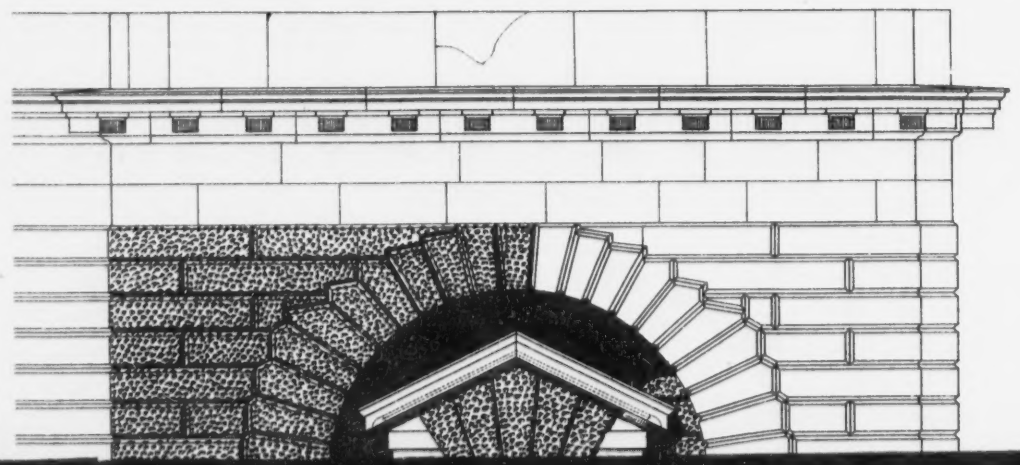
INK-PHOTO. SPRAGUE & Co 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

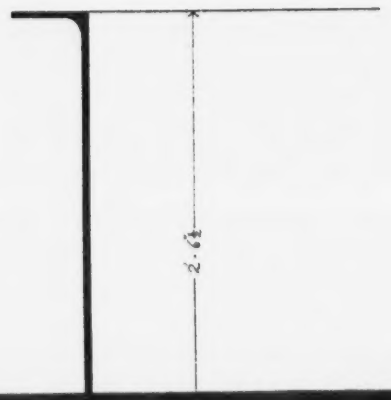


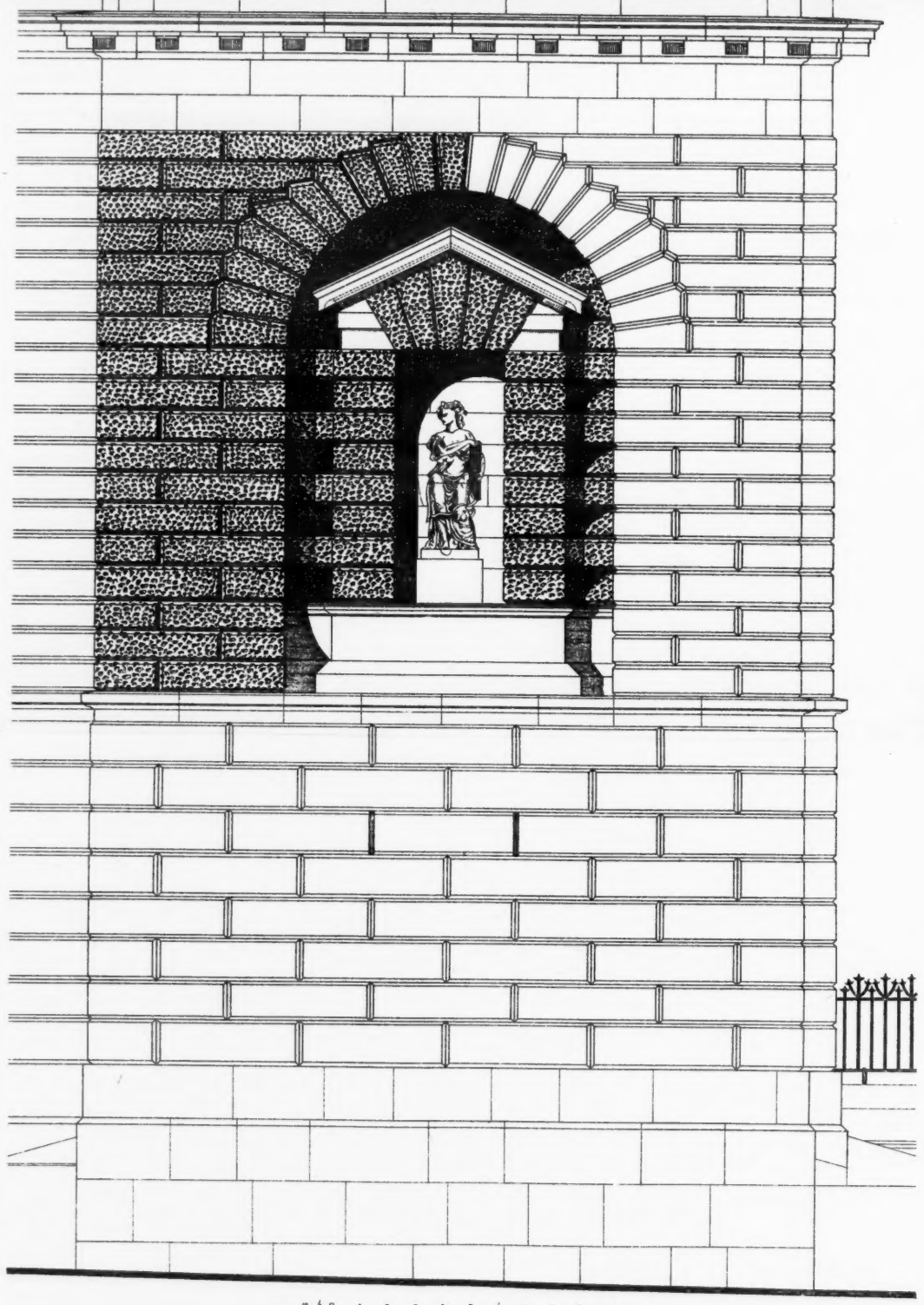
ELEVATION OF THE PRINCIPAL FRONT.

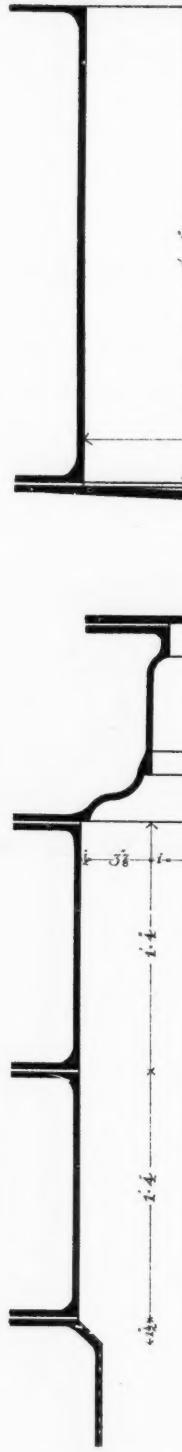
Scale 10 0 1 2 3 4 5 6 7 8 9 10 of Feet

PLAN SHOWING THE BREAKS IN THE FRONT AT FOOT.

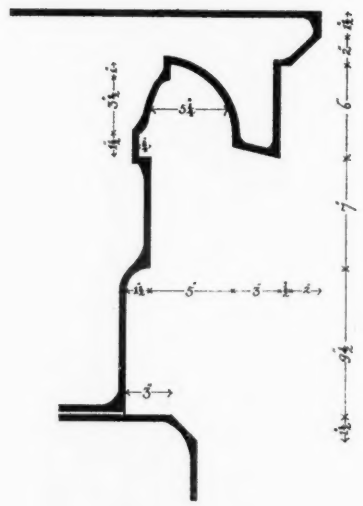




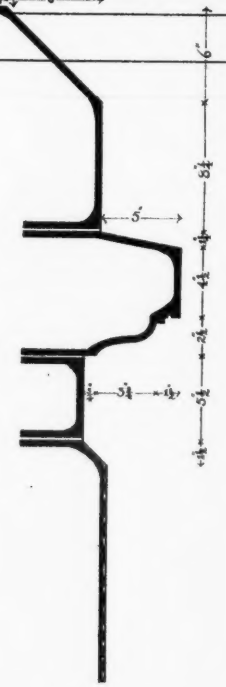




CORNICE



PEDIMENT



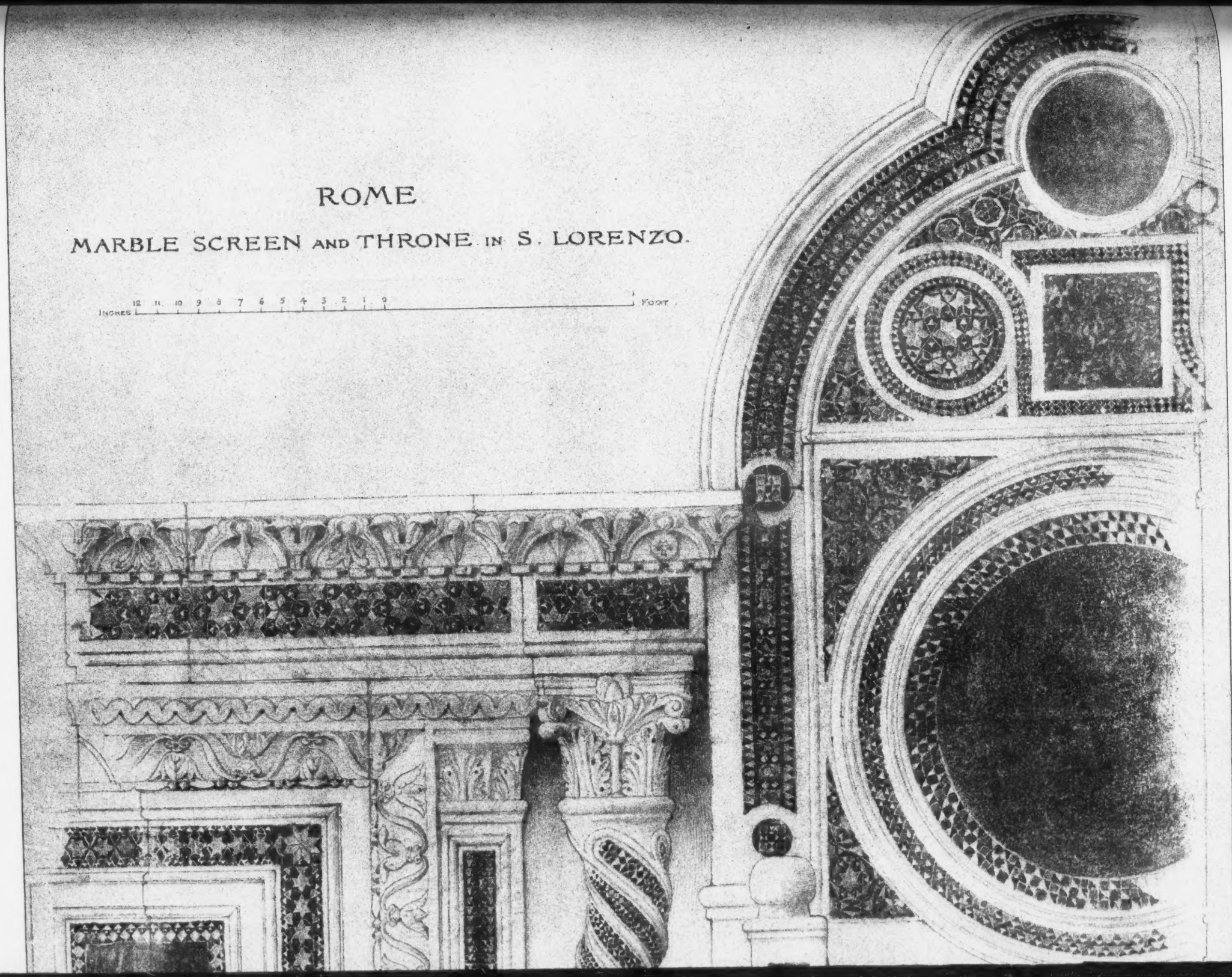
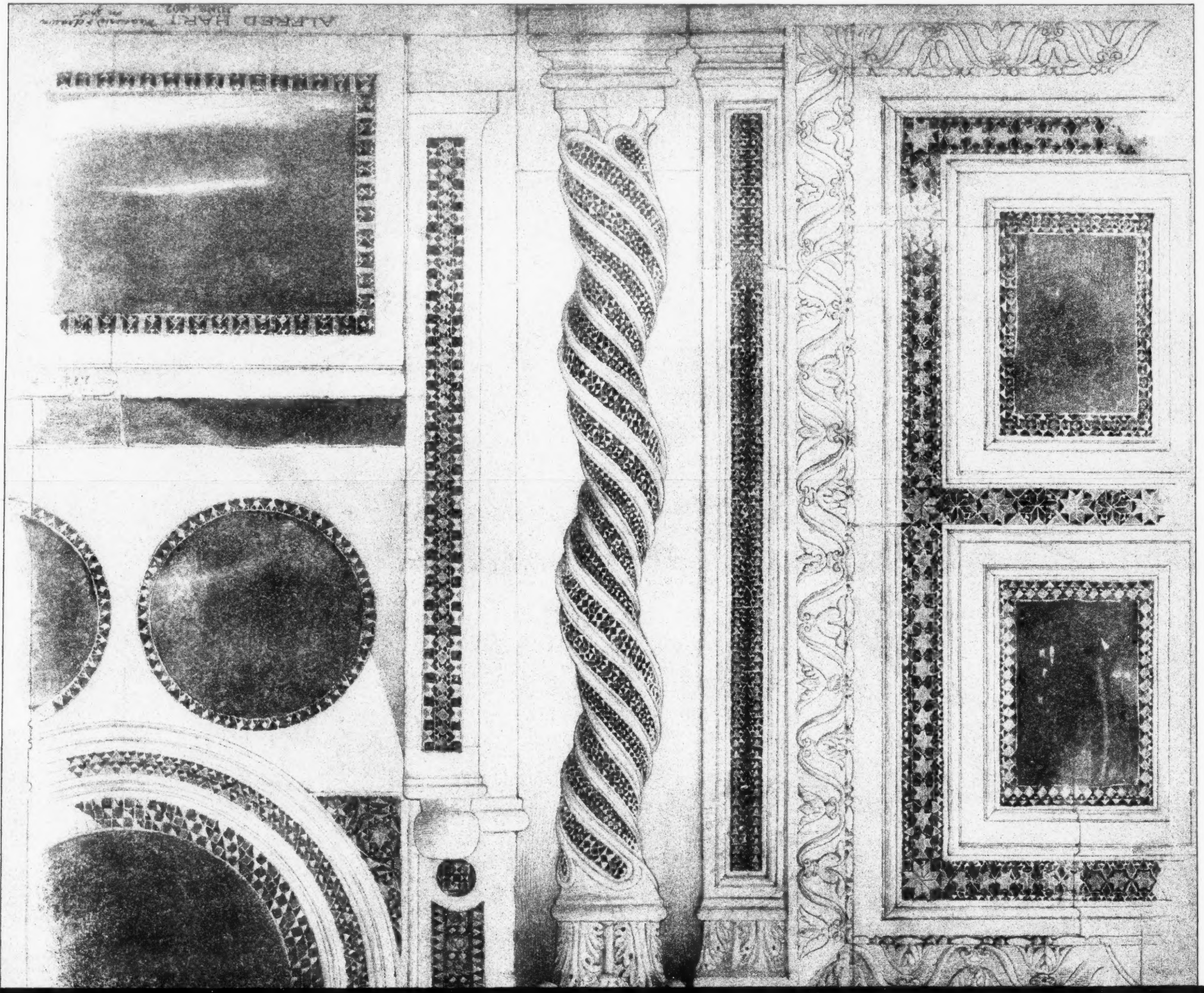
PEDESTAL AND STRING

INK-PHOTO. SPRAGUE & Co 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

ELEVATION AND DETAILS OF NEWGATE PRISON.—MEASURED AND DRAWN BY MR. G. J. LACY.

ROME

MARBLE SCREEN AND THRONE IN S. LORENZO.



INK PHOTO SPRAGUE & Co 3 & 5 EAST HARDING STREET, FETTER LANE, E.C.